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DISEASES CAUSED BY BACTERIA AND FUNGI.

SEWERTZOVA, S. B. (1931). Influence du rayonnement mitogénétique sur la vitesse de multiplication des bactéries. [**Influence of Mitogenetic Radiation on the Speed of Bacterial Multiplication**].—*Ann. Inst. Pasteur.* **46.** 337-371. 4 figs., 11 tables. [14 refs.]

In 1923 GOURVITCH published an account of a biological induction which provoked an excess of mitoses in multiplying cellular tissues. In his original work, he used the cells of the onion, both as the inductor of the mitogenetic ray and as the detector of the excessive mitosis.

The present author describes some experiments in which he has used a number of bacteria (chiefly *B. megatherium*) as detectors of increased multiplication, while, to induce the radiation, he has used yeast cultures, tetanized muscles, pulsating hearts and fresh spleens from frogs. From the results of a number of controlled experiments, he concludes that all these inductors emit a mitogenetic radiation capable of provoking a remarkable degree of multiplication in bacteria exposed to its action through " quartz crystalline." The tetanized muscle exhibited the greatest power of augmenting bacterial division. The mitogenetic radiating power of the pulsating heart was found to be proportionate to the duration of exposure but, with the other inductors, no relationship was found between inductive power and the time or volume of exposure.

NORMAN HOLE.

GILBERT, I. (1931). **Dissociation in an Encapsulated Staphylococcus.**—*J. Bact.* **21.** 157-160. 4 figs. on 1 plate.

The original staphylococcus, which showed a well-marked capsule in India ink preparations, was obtained from the pericardial and peritoneal fluids at the autopsy of a case of acute gonococcal endocarditis. No pericarditis or peritonitis was present. A typical *Staph. aureus* appeared in cultures of heart blood.

The capsulated strain, whose morphological, cultural and biochemical properties are fully described, was highly virulent for guinea pigs, 0·025 c.c. intraperitoneally causing death within 24 hours. Dissociation occurred in

cultures on various media, which had been kept in the incubator or on ice for from 15 to 20 days, but more readily in broth media and at incubator temperature. The dissociate was apparently a typical staphylococcus and was nearly avirulent, 5 c.c. producing no effect. Larger amounts, 8 to 10 c.c., however, occasionally caused death in guinea pigs. If death occurred within 24 hours no change in the nature of the organism occurred, but if it occurred after 48 hours, or if animals which had not died within 24 hours were killed, cultures of the peritoneal fluid showed both capsulated and non-capsulated forms. The virulence of the capsulated strain thus obtained was equal to that of the original capsulated strain. Control plates of the injected strain showed no capsulated organisms.

The author uses the term S for the virulent form and R for the dissociate.

A. W. STABLEFORTH.

HOLE, N., & PURCHASE, H. S. (1931). **Arthritis and Periostitis in Pheasants caused by Staphylococcus pyogenes aureus.**—*J. Comp. Path. & Therap.* **44.** 252-257. 1 fig., 3 tables. [3 refs.]

The disease was found to be due to infection with *Staphylococcus pyogenes aureus*. One similar case appeared to be due to *S. pyogenes citreus*. About 100 birds, 3 per cent. of the total stock of the estate concerned, were lost or destroyed. The first symptoms were noted when the birds were six to ten weeks old, no evidence of infection occurring after the 14th week being observed.

The organisms appeared to be disseminated primarily by the blood stream, the disease resolving itself into an acute septicaemia or, more commonly, a chronic arthritis. The reasons given for this conclusion are that birds dying in plump condition of septicaemia showed no lesions, that birds showing joint lesions were poor or emaciated and that joints of the wings as well as of the legs were frequently affected.

By choosing birds of a suitable age both forms of the disease were reproduced artificially. Efforts to immunize with one or two doses of heat-killed culture were not successful. Infection by wounds is regarded as the most probable route and there was some reason to suspect thistles as the wounding agent.

A. W. STABLEFORTH.

HEWITT, L. F. (1931). **Oxidation-reduction Potentials of *Staphylococcus* Cultures. II. Effect of Bacteriophage.**—*Biochem. J.* **25.** 2068-2071. 2 figs. [4 refs.]

It is shown that the oxidation-reduction potential of ordinary aerobic broth cultures of *Staph. aureus* falls for the first few hours either in the absence or presence of bacteriophage. It then continues to fall, but less rapidly, in the absence of the bacteriophage, but in its presence it becomes stationary or rises slightly. If the cultures containing bacteriophage be aerated then, after the initial fall in potential, it rises and falls again and then subsequently rises and falls once more. This final fall is associated with obvious proliferation, but no growth appears to be demonstrable with the second fall of potential. It is suggested that, whilst the final fall in potential is due to bacterial proliferation, this previous fall is entirely due to enzymes of dead cells. [This statement would have been of much greater value if adequate bacterial counts had been made throughout the experiments].

W. R. WOOLDRIDGE.

DADLEZ, J., & KOSKOWSKI, W. (1932). Les échanges gazeux dans la fièvre provoquée par le *Staphylococcus aureus*. [**The Respiratory Exchange in Fever induced by** *Staphylococcus aureus*].—*C. R. Soc. Biol. Paris.* **109.** 301-302. 1 table. [1 ref.]

The effects of the intramuscular injection into dogs of saline suspensions of *Staph. aureus* are described. If the organism be freshly isolated then there is a marked rise in body temperature, sometimes as high as 40° to 41° C. [104° to 105·8°F.], whilst the respiratory quotient is lowered. That these results are not due to the bacterial proteins was shown by the injection of old, attenuated cultures, when no symptoms were produced.

W. R. WOOLDRIDGE.

ORR, J. W. (1932). **The Spleen in Streptococcal Infections: a Histological Study of the Changes in Experimental Infections of the Rat.**—*J. Path. Bact.* **35.** 149-160. 8 figs. on 4 plates. [14 refs.]

The author gives a histological account of the reaction in the spleen of rats infected with various strains of haemolytic streptococci. Injections were made subcutaneously with 16-hour cultures, the dose usually being 0·3 c.c. The Aronson Schnitzer strain was found to be the most pathogenic and was most frequently used.

The account is based on the findings in 61 rats which died or were killed after intervals of from 3 hours to 18 days. The earliest changes are observed in the lymphoid and reticulo-endothelial elements and these appear to precede any demonstrable infiltration of the spleen with polymorphonuclear leucocytes. The greatest primary activity is found in the peri-malpighian zone, at the boundary between the lymphoid follicles and the pulp. Proliferation of reticulum cells with disappearance of lymphocytes is followed by marginal accumulation of neutrophile leucocytes. When the animal dies—in all cases with streptococcal septicaemia—focal necroses are found in the peri-malpighian region. Subsequent changes in the pulp are congestion, infiltration with polymorphs, multiplication of reticulum cells and later of lymphocytes and plasma cells. There is progressive decrease in size of the malpighian bodies. Some of the macrophages may be derived from lymphocytes.

A. W. STABLEFORTH.

CURRAN, H. R. (1931). **Bacterial Growth in the Udders of Living Cows compared with that in the Udders following Death and Removal of the Blood Supply.**—*J. Infect. Dis.* **48.** 408-412. 1 table. [11 refs.]

The author comments on the inhibiting action which fresh raw milk exerts on many kinds of bacteria. While there is substantial agreement regarding its existence, yet there is a difference of opinion regarding the nature and source of the inhibitory factor. Accordingly, bacterial counts were made of the milk present in the udders of several cows on the two successive days before slaughter. Immediately after slaughter of the cows the udders were removed and allowed to drain of blood and then placed in a box at a temperature of 37° C. for 4 hours. Bacterial counts showed that some types of bacteria, maintained in the udders of living cows at a fairly constant numerical level, multiplied with great rapidity immediately following the death of the cows and removal of blood. Rapidly-growing types of streptococci were most affected. The flora of the udders of some

cows did not increase appreciably during the *post-mortem* incubation period ; slow-growing cocci comprised this group. It is considered that the suddenly increased multiplication of the flora of the udders following the withdrawal of the blood is suggestive of the circulating system being directly or indirectly associated with the formation of the bactericidal substance in milk.

R. LOVELL.

TULLBERG, K. (1932). Om ympning mot diplokockjuverinflammation hos ko. [**On Vaccination against Diplococcal Mastitis in the Cow**].—*Skand. Vet.-tidskr.* **22.** 302-319. 4 tables. [Summary in English : abst. from orig.]

In a previous publication [(1930). *Skand. Vet.-tidskr.* **20.** 211.] the author discussed the character of two types of diplococci from cases of bovine mastitis and experiments made with them, the diplococci of the one type being avirulent and of the other virulent for mice. He now records further investigations with these two types of diplococci. A live vaccine, prepared from the avirulent diplococcus, was used in a herd in which cases of diplococcal mastitis were occurring and was found to be incapable of exercising protective action. A live vaccine, prepared from the virulent strain, was injected subcutaneously and intravenously into two cows from a mastitis-free farm. Subsequently, intra-mammary injections of the same organism were made into these two cows and into two controls ; the mastitis which followed in each case was most severe in the controls. A further test of the virulent vaccine on an affected herd showed conclusively that it was innocuous and that it possessed protective, but not curative, properties.

G. B. BROOK.

SEELEMANN, M., & SIEMONSEN, K. (1932). Experimente und Boebachtungen an Milchkühen im Rahmen der Galtforschung. I. Mitteilung. Infektions- und Uebertragungsversuche. [**Experiments and Observations on Milch Cows in the Course of Mastitis Investigations. I. Infection and Transmission Experiments**].—*Arch. wiss. prakt. Tierhlk.* **64.** 457-467. 3 charts. [1 ref.]

The author notes that, although mastitis infection appears to spread more or less rapidly and the teat canal is nearly generally accepted as the path of infection, attempts to produce infection by bringing infective material into contact with the outside of the udder have not succeeded. He reports experiments on two cows.

In the case of one, long-continued attempts to set up mastitis by means of milking with infected hands or by dipping the teats in infected milk had failed. Mastitis was subsequently produced by other methods : in one quarter by the injection of 10 c.c. of milk containing streptococci, in two quarters by the insertion of a smooth canula which had been dipped in mastitis milk and in the other by the insertion of an infected canula which had been specially sharpened and roughly used so as to cause slight bleeding.

In the second cow, repeated attempts to produce mastitis by means of a smooth infected canula, by dipping the teats in infected milk or by using infected straw for three months were unsuccessful. Subsequently, mastitis was produced in all quarters : in two by injection of 5 c.c. of infected milk, in one by the insertion of a smooth canula and in the other, after one failure using a smooth canula, by means of a sharpened canula and simultaneous damage of the mucous membrane.

A. W. STABLEFORTH.

STECK, W. (1932). Ueber die Eutercorynebakterien und ihre Beziehungen zu den Euterstreptokokken. [**On Udder Corynebacteria and their Relations to Udder Streptococci**].—*Zlb. Bakt. I.* (*Orig.*). **124.** 227-236. 5 figs., 4 tables. [22 refs.]

The author has previously reported that corynebacteria can be demonstrated in a large percentage of carefully taken milk samples from healthy cows by incubation on the ordinary serum media for about a week. The organisms described are non-pathogenic and their only importance in dairying is that they are fat splitters. Their characters are discussed. Prolonged observations on their association with streptococci are exemplified by tabulated summaries of the bacterial fluctuations in three quarters. It is concluded that the udder corynebacteria form a characteristic group of udder bacteria which are amongst the most frequent inhabitants of the normal udder, that they may be present alone and with other bacteria ; and that they are inhibited by the reaction provoked by virulent bacteria, but after its disappearance again become demonstrable. They are, however, apt to be overlooked in the presence of other organisms.

A. W. STABLEFORTH.

BRUNETT, E. L. (1931). **Transmission of** *Bacterium pullorum* **Infection among Mature Chickens. II.**—*Rep. New York State Vet. Coll. for 1929-30.* pp. 114-116. [2 refs.]

The author reported in an earlier publication the results of experiments in which *B. pullorum* infection failed to spread from affected to healthy hens in the absence of cock birds, and that when non-infected hens and reacting cock birds were kept together there was no evidence that transmission occurred.

He now reports that in a pen containing 2 non-reacting cocks, 13 reacting and 12 non-reacting hens, there was no evidence, as shown by agglutination test, that transmission of infection had occurred, although the birds had been together for nine months.

In another experiment, in which 14 reacting and 14 non-reacting hens were used, one bird was found to have contracted infection.

Brunett believes that infection spreads amongst adult stock, but that the rate of spread is not so rapid as it is generally assumed to be.

T. M. DOYLE.

ŠEVCÍK, F. (1932). Umělá infekce koně bacilem ozhřivky vypěstěným z ozhrivé kozy. [**Artificial Infection of the Horse with** *B. mallei* **isolated from an Infected Goat**].—*Zverol. Rozpravy.* **6.** 35-53. [1 ref.]

The author succeeded in infecting a horse by inoculation with a strain of *B. mallei* isolated from an affected goat. The local and general reaction was very pronounced. After four weeks the skin lesion healed and the swelling of the affected lymph glands disappeared so that the horse showed no symptoms of infection. Seventeen months later the horse died in a cachectic condition. The *post-mortem* examination revealed typical cicatrices in the nostrils and enlargement of the mesenteric lymph glands. A guinea pig inoculated intraperitoneally with a suspension prepared from the lymphatic glands died from purulent peritonitis. Cultures of bacteria which were isolated from the heart of this guinea pig were different in type from *B. mallei* and were not agglutinable when used as an antigen against positive sera. On the basis of these results the

author concludes that the morphological and serological differences of the strain of *B. mallei* may have been produced by the passage of the strain through the goat.

E. PRIBYL (BRNO).

BLUMENTHAL, G. (1931). Zur Serodiagnostik der Tuberkulose. [**On the Serological Diagnosis of Tuberculosis**].—*Zlb. Bakt. I.* (*Orig.*). **122.** 62-65. [14 refs.]

WITEBSKY, E., KLINGENSTEIN, R., & KUHN, R. (1931). Zur Serodiagnostik der Tuberkulose. [**On the Serological Diagnosis of Tuberculosis**].—*Ibid.* 65-69.

These writers have used a complement fixation technique and refer to the difficulties which have beset most workers, due chiefly to the fact that a large proportion of cases of tuberculosis show a low reactivity and to the fact that extracts containing even small amounts of lipoid also react with luetic sera.

Blumenthal's technique [(1924). *Deuts. med. Wschr.* **50.** 673.] depends on preliminary treatment of the bacilli with acetone and then ether, and final extraction with distilled water. Sera were always tested simultaneously by the Wasserman test. The second authors treated dried bacilli with hot alcohol and extracted with hot pyridine.

In general it may be said that the authors of both papers were able to detect most pulmonary cases unless very severe. Cases in skin, and in bones and joints, were usually negative, though the latter workers detected a large proportion of cases of so-called " moist " lupus.

Blumenthal states that his antigen, although giving a similar number of positive results to tuberculin antigen in immunized animals, detects a much greater percentage of natural cases.

Both antigens appear to have been fairly specific as regards other diseases. Both still gave some reaction with luetic sera. The latter authors found that, with their antigen, these could be removed to a large extent by inactivating the sera at 60° to 62° C. They also obtained strong reactions in leprosy. The reactivity of a serum was removed by absorption with tubercle bacilli or diphtheria bacilli.

A discussion followed in which comparison was drawn with direct cultural methods (Lowenstein).

A. W. STABLEFORTH.

HOHN, J. (1931). Der Z-Einährboden zur Kultur des Tuberkelbazillus (Die Typendifferenzierung und das Wachstum von B.C.G. auf Z- Einährboden). [**Z Egg Culture Medium for the Cultivation of Tubercle Bacilli (The Differentiation in Types and the Growth of BCG on Z Egg Culture Medium)**]. —*Zlb. Bakt. I.* (*Orig.*). **121.** 488-506. 1 fig. [27 refs.]

The author describes in detail which does not allow of abstraction the preparation of an egg-medium which has haematin present in it. The haematin is derived from blood-clot and is obtained by keeping the clot in the cool chamber for four days. This medium favours the development of the tubercle bacillus. The addition of malachite green 1 : 4,000 increases the sterility of the medium without in any way rendering it less useful for the tubercle bacillus. The addition of 2·5 per cent. glycerol (instead of 1·25 per cent. previously recommended by the author) also favours growth. The eggs are coagulated by exposure to a

temperature of from 79° to 83° C. for half an hour. Dimpling of Z and other egg media is prevented by placing the tubes in the cold chamber for half an hour before they are coagulated.

Tubercle bacilli of human and bovine types are readily distinguished on the Z medium. BCG grown on the medium develops a characteristic appearance which most closely resembles the human type.

A. LESLIE SHEATHER.

HARNACH, R. (1932). Kongenitální tuberkulosa a virus filtrabilní. [**Congenital Tuberculosis and Filtrable Virus**].—*Zverol. Obzor.* **25.** 61-66.

The author gives a short survey of scientific theories concerning the ultrafiltrable form of the tubercle bacillus and the importance of the ultrafiltrable virus in congenital infection in human beings. He believes that the number of calves found on *post-mortem* examination to be affected with tuberculosis would be greatly increased if those infected by the ultravirus were also included in the statistics.

E. PRIBYL (BRNO).

SPANIER, P. (1931). Ueber die Lyse der Kochschen Bazillen im sensibilisierten Organismus einer gegen Tuberkulose resistenten Tierart. [**The Destruction of the Tubercle Bacillus in the Sensitized Body of a Species of Animal Resistant to Tuberculosis**].—*Zlb. Bakt. I.* (*Orig.*) **121.** 451-460. 1 table. [88 refs.]

Immunity against tuberculosis is of a cellular nature and the author found that leucocytes from different species of animals varied in their capacity to destroy tubercle bacilli *in vitro*. The slight effect that the tissue fluids have upon tubercle bacilli is probably referable to the possession by the bacillus of a resistant envelope. Unaltered bacilli are chemically inactive and act as foreign bodies in the tissues. The result of this is that antibody formation is not stimulated and there is no real immunity. Antibodies are only produced in a sufficient quantity when absorbable antigens are present.

Up to the present the methods of destroying the bacilli have acted unfavourably upon their antigenic properties.

Published investigations in this connection have shown that the resistance to infection with tuberculosis of the animals used has only been taken into consideration to a small extent. This point requires further investigation. In the case of tuberculosis the condition of infection itself increases resistance. This is shown by the differences in the reaction of non-infected and infected animals when they are inoculated.

The author's experiments have been directed towards a study of the disintegration of tubercle bacilli in animals resistant to but infected with tuberculosis. These indicated that lysis of tubercle bacilli injected into previously infected animals (dogs) was brought about by phagocytosis, intracellular digestion and extracellular bactericidal substances. The processes of lysis are more marked, both quantitatively and qualitatively, in resistant than in susceptible animals. Since a sensitized animal possesses a higher resistance to infection, the evidence of lysis of the bacilli is most marked when there is a combination of the factors resistant body + reinfection with tuberculosis. It is possible that such products might be found to possess antigenic properties which would render them valuable in the immune-therapy of tuberculosis.

A. LESLIE SHEATHER.

—. (1932). Neue Richtlinien fur die Bekämpfung des ansteckenden Verkalbens vom 1. Februar 1932. **[New Directions for the Campaign against Bovine Contagious Abortion from February 1st, 1932].**—*Deuts. tierärztl. Wschr.* **40.** 122-124.

The Abortion Commission of the Imperial Centre for the Campaign against Diseases of Breeding Animals now consists of 13 members. In February, 1931, this Commission drew up a set of regulations to be applied to the campaign against bovine contagious abortion and these regulations, revised a year later, are the subject of the present publication. It is a very important document and really merits a full translation, but shortage of space does not permit this.

The first section deals with the preparation of cultures for vaccination purposes, including rules for the use of definite culture media. At least five strains of *Br. abortus*, none of them more than 18 months old, are to be used as stock and freshly isolated strains, excluding highly virulent ones, are to be introduced from time to time.

The second section contains details relating to the control of the disease and is divided into five main parts dealing with :—(1) the preliminary inspection of a herd ; (2) methods for the elimination of the disease in slightly infected herds ; (3) the campaign against the disease by inoculation, in conjunction with hygienic measures ; (4) protective measures against dissemination of the disease and (5) the significance of *Br. abortus* infection for human health.

In the first part, the Commission states that it is very desirable that diagnosis should not be based merely on the results of a blood test, but that aborted foetuses and fragments of the foetal placenta should be demanded by diagnostic laboratories. In the third part, it is laid down that live vaccines should only be used on heifers and non-pregnant cows and then only in heavily infected herds (more than 10 per cent. of infected animals in the herd). The Commission considers that heifers should not be inoculated unless abortions of primiparae have occurred and that heifers should not be covered until at least three months after inoculation ; cows should not be covered for at least six weeks. Vaccination should be continued over two or three consecutive pregnancies.

Copies of these regulations may be obtained on application to the Hygienische Institut der Tierärztlichen Hochschule, Hannover.

J. E.

Lentz, W. (1932). Ein Beitrag zur serologischen Diagnostik und zur Bekämpfung des seuchenhaften Verkalbens. **[A Contribution to the Serological Diagnosis and Control of Contagious Abortion].**—*Deuts. tierärztl. Wschr.* **40.** 84-87. [14 refs.]

The author reports a comparison of the relative value of the agglutination test and the complement fixation test on 863 sera, positive to one or other of these tests. In 510 cases a positive result was obtained by both tests, whilst in 212 cases the fixation test only was positive and in 141 cases the agglutination test only. It is concluded that, in agreement with earlier work, the fixation test is of the greater value. With a further 134 sera these tests were supplemented by Menck's modification of a reaction similar to that used by Meinicke for the diagnosis of syphilis. In 53 cases, however, a positive result was obtained with this reaction although none was obtained by the other methods. In 74 cases all three reactions gave positive results. Chinosol was a satisfactory preservative for antigens and sera.

By means of the reactions mentioned the effect of immunization with living organisms and with those killed with chinosol or other agents was compared on 255 cows, of which 15 had positive reactions before treatment. A single subcutaneous injection was given, the dose being from 10 to 50 c.c. The response, which was measured after 5, 8, 12 and 20 days respectively was similar in the case of living organisms and of those killed with chinosol, definite fixation (0·02 c.c.) and an agglutination titre of 1 : 400 being nearly regularly met with by the 8th day and reaching 1 : 800 or 1 : 1,600 at 20 days. No response to the other killed vaccines was detected. The practical value of the antibody response and its duration were not investigated. It is suggested that the similarity of the results with living organisms and with those killed with chinosol is due to the fact that the cell is killed by an inhibition of the intramolecular respiration without influence on the cell substance in general and the antibody producing portion in particular.

A. W. STABLEFORTH.

I. HADLEY, F. B. (1931). **Bang's Disease Control in Wisconsin.**—*North Amer. Vet.* **12.** No. 6. 21-22.

II. KILLHAM, B. J. (1931). **The Abortion Field Project in Michigan.**—*Vet. Med.* **26.** 368-371. [Address at the 8th Annual Post Graduate Short Course for Veterinarians, Michigan State College, East Lancing, U.S.A.]

III. WELCH, W. H. (1931). **Regulatory Aspects of Abortion Disease Control.**—*Ibid.* 371-372. [Address at the 12th Annual Illinois Veterinary Conference, University of Illinois.]

IV. KITSELMAN, C. H. (1931). **Practical Points on Bang's Disease Eradication.**—*Ibid.* 482-484.

V. BOOTH, T. O. (1931). **Bang's Disease Control from a Practitioner's Viewpoint.**—*Ibid.* 304-308.

These five articles deal with the subject of the eradication of bovine abortion from herds from different viewpoints and papers I, II and III describe the method adopted in the States of Wisconsin, Michigan and Illinois respectively. IV describes a few important points which deserve attention and V describes the agglutination test in some detail for the benefit of the practitioner.

I. In Wisconsin practitioners are required to demonstrate their ability to administer and interpret the agglutination test before they may be " approved " as competent to conduct abortion control work.

II. The further education of the farmer is advocated in regard to symptoms such as (a) abortion, (b) retained placenta, (c) breeding deficiency, (d) diseases of the udder, (e) pneumonia in calves and (f) scours in calves. This author states that the abortion control in Michigan comes under three headings :—(a) blood test, (b) segregation and (c) sanitation. In Wisconsin [see I] the plan has two main purposes, (a) the location of infected herds and (b) the establishment of clean herds from which recruitment may take place.

III. In Illinois there has been in existence since 1930 a regulation prohibiting the importation of dairy and breeding cattle which have failed to give a negative result to the agglutination test. The definition of infection includes all animals which have received living vaccine within one year and abortus bacterin within six months. The author further says, " It is somewhat surprising that, in spite of all authority on the subject and in spite of the fact that there is no hope of eradicating

the disease from a herd by the use of live abortion vaccine, this agent is still used by many veterinarians in the state."

IV & V. The remaining two authors deal with advice to practitioners for the elimination of Bang's disease [see IV] including the collection of lists of all breeding cattle on the farm in question together with their blood reactions listed in a semi-annual test. Two sets of maternity stalls are kept as far apart as possible, one being used for blood reactors and the other for blood-negative cases.

Certain methods are discussed from the practitioner's point of view [see V] and the agglutination test is described in detail. The author considers that it is possible to control the disease in infected herds to a greater or lesser extent by a strict sanitary programme.

G. W. DUNKIN.

I. DUBOIS, C., & SOLLIER, N. (1932). Diagnostic de la Fièvre ondulante. Simplification de la Technique de l'intradermo-réaction de Burnet. [**Diagnosis of Undulant Fever. Simplification of the Intradermal Reaction of Burnet**].—*C. R. Soc. Biol. Paris.* **109.** 359-361. [2 refs.]

II. STENZEL, K. G. (1931). Bangsche Krankheit und Urologie. [**Bang's Disease and Urology**].—*Zeitschr. Urol.* **25.** 267-271. [14 refs.]

I. A comparison was made of two preparations of melitine, obtained by growing *Br. melitensis* in ordinary veal peptone broth and in a glucose broth made with human placenta respectively, by intradermal injection of seven patients affected with undulant fever and of 39 subjects who were normal or affected with other diseases. It was found that melitine prepared with the placenta broth had the same specific properties, but did not give rise to the pseudo-reaction caused by ordinary broth.

II. A discussion of the course of human infection with *Br. abortus* with particular reference to the male genitalia.

The author makes certain comparisons with infection in animals and stresses the fact that orchitis occurring in man during the course of any continued fever of uncertain aetiology suggests brucella infection.

A. W. STABLEFORTH.

KRANEVELD, F. C. (1931). Anaërobe Bacillen en de door hen Veroorzaakte Infecties bij de Huisdieren in Nederlandsch-Indië. I. Algemeen overzicht over den tegenwoordigen stand van het vraagstuk der gasoedemen en hun verwekkers. II. Een en ander over de in Ned.-Indië voorkomende infecties door anaërobe bacillen en over de wijze van opzenden van ziektemateriaal. [**Anaerobes and the Diseases caused by them in Domesticated Animals in the Dutch East Indies. I. General Review of the Present Position regarding Gas Oedema and its Causes. II. The Diseases caused by Anaerobes in the Dutch East Indies and the Method of dispatching Material for Examination**].—*Ned.-Indisch. Blad. v. Diergeneesk.* **43.** 459-482 and 483-499. [Summary in English: abst. from orig.]

As indicated by the title, this paper is a general review of the literature regarding the anaerobes which have been described as being associated with the production of the diseases generally grouped together under the term "gas-oedemas."

The classification devised by ZEISSLER is reproduced.

Up to the present the following diseases due to anaerobic infection have been identified in the Dutch East Indies :—blackleg, infection with Fraenkel's bacillus (*B. welchii*), bacillary osteomyelitis of buffaloes, para-blackleg and tetanus.

As opportunity offers, cases of anaerobic infection will be investigated following the lines suggested by ZEISSLER.

The difficulties experienced in temperate countries in the investigation of diseases caused by anaerobes are more serious in Java where the damp climate favours the multiplication of accidental organisms. The system of packing specimens for examination in crude salt is not satisfactory as this may and does contain anaerobes. It is suggested that the use of plaster of Paris rods such as are used in the diagnosis of anthrax may prove a way out of the difficulty.

A. LESLIE SHEATHER.

ASHTON, G. (1932). **Cattle Ringworm in Man.**—*Lancet.* **222.** 97-99. [35 refs.]

The information contained in this paper was collected during an enquiry into the prevalence of cattle ringworm in man initiated by the Ministry of Health. The sources of the information were (a) the existing literature and (b) interviews with 384 insurance practitioners in England and Wales whose practices were thought likely to afford opportunities of observing cases of the disease. Eighty-eight of the practitioners had never encountered the condition and 132 stated that cases were extremely rare.

In human beings infection is almost invariably the result of handling infected calves. Constitutional disturbance is rare and in most cases occurs when secondary infection has taken place.

A. LESLIE SHEATHER.

CATANEI, A. (1931). Observations sur les caractères de souches Algériennes de champignons des teignes dans diverses conditions de culture et sur leurs altérations séniles ou pléomorphiques. [**Observations carried out on Algerian Strains of Ringworm Parasites under Various Conditions of Cultivation, with an Account of the Changes resulting from Age and Pleomorphism**].—*Arch. Inst. Pasteur d'Algérie.* **9.** 451-469. 13 figs. on 1 plate. [11 refs.]

The classification of the ringworms devised by SABOURAUD is based very largely upon the employment of culture media of definite composition, which were kept at laboratory temperature. In fact it was stated by SABOURAUD that the cultural characters presented by the fungi depend upon the composition of the culture media used. In the present paper the author describes observations upon cultures of Algerian strains of ringworm grown upon the classical and upon new media kept at different temperatures. The paper is of interest principally to the systematist and does not lend itself to abstraction.

By the use of special media the author has been able to find typical spores in cultures of a strain resembling *Trichophyton album* Sabouraud, 1909, and he concludes that the organism should be classified as *Tr. mahusten*, 1848 as amended by LANGERON and MILOCHEVITCH. Spores have also been found in cultures of *Achorion schönleini*.

The development of a white downy growth on *Tr. acuminatum*, a form of growth not hitherto observed, was a true case of pleomorphism as defined by SABOURAUD. The inoculation of guinea pigs with strains which have undergone pleomorphic degradation in culture produces atypical lesions.

A. LESLIE SHEATHER.

DAVIDSON, A. M., DOWDING, Eleanor S., & BULLER, A. H. R. (1932). **Hyphal Fusions in Dermatophytes.**—*Canad. J. Res.* **6.** 1-20. 22 text figs., 3 plates. [18 refs.]

The authors describe the technique of obtaining cultures of the organisms producing ringworm and of observing the occurrence of fusion of hyphae in such cultures. Details are given of the observations on a number of different species.

It was found possible to get fusion of hyphae in artificial cultures between hyphae of the same mycelium and between hyphae of the same species, but of different origin. It was not found possible to detect any fusion between hyphae of different species. Working along these lines, the authors find that specific identification of species can be achieved by cultivating the fungus under examination alongside a series of known species and observing whether any fusion of hyphae takes place. It is claimed that by proceeding in this way specific identification can be established by the examination of the paired cultures at three weeks, instead of waiting for a period which may run into months for the formation of characteristic spores in the pure cultures.

A. LESLIE SHEATHER.

DISEASES CAUSED BY PROTOZOAN PARASITES.

BAKKER, S. (1932). Over de Surra en hare bestrijding in Nederlandsche-Indië. [**Surra and its Control in the Dutch East Indies**].—*Tijdschr. Diergeneesk.* **59.** 19-32. [Summary in English : abst. from orig.]

A brief survey is given of the history of the discovery of surra in the Dutch East Indies and a few statistical figures regarding its prevalence. Before describing his own experiments in the treatment of the disease, the author reviews very shortly the existing literature on the subject.

Twelve horses were subjected to treatment with naganol in combination with atoxyl, tartar emetic and tryparsamide. Apparently six of them were cured. Judging from the small number of experiments the best combination was naganol and tartar emetic. In some cases cure was controlled by biological tests.

130 adult buffaloes were treated with success with 5 g. doses of naganol and it did not appear to be necessary to use any other drug with the naganol. Favourable results were obtained also with the same treatment in cattle.

An experiment was carried out with about 1,300 horses to test the protective value of naganol. The injection of 1 g. of naganol in 5 per cent. solution intravenously was found to protect animals for periods ranging from one to two months. The author recommends 1 g. naganol per 100 kg. bodyweight.

For the protective inoculation of buffaloes 2 to 3 g. doses of naganol are recommended.

The difficulty of detecting the infection in buffaloes by direct blood examination makes it desirable to employ some other method of diagnosis. The author has used the formol-gel test, the sublimate reaction and the complement fixation test. In the last of these a watery trypanosome extract was found to be a good antigen.

A. LESLIE SHEATHER.

KNOWLES, R., & DAS GUPTA, B. M. (1931). **Two Intestinal Mastigophora from an Indian Bull.**—*Ind. J. Med. Res.* **18.** 1299-1309. 3 plates. [28 refs.]

The original material was faeces obtained from cattle suffering from rinderpest

complicated by coccidiosis. Later, material was obtained from seven bulls suffering from diarrhoea. The faeces were centrifuged and part of the deposit was diluted with normal saline solution and incubated for three days at 22° C. Later it was found that Laidlaw and Dobell's HSre medium and Row's haemoglobin saline medium were suitable for the cultivation of the flagellates. A large and small flagellate developed. The small variety was characterized by the possession of a cytostome, two flagella, a spherical anterior nucleus and a definite periplast. Cysts were formed in culture. The flagellate resembles *Embadomonas agilis* of tipulid and trichopteran larvae. The authors suggest the name *Embadomonas ruminantium*.

The second and larger flagellate soon died out in cultures. It possessed a large oval anterior nucleus, three delicate anterior flagella and a thicker posterior flagellum. An axostyle was usually present and a " crescentic fibril " was sometimes seen. The authors suggest that the crescentic fibril is the strengthening basal fibril of an undulating membrane and that the organism is in fact the *Trichomonas ruminantium* Braune, 1913, seen in degenerating phase.

U. F. RICHARDSON.

VOLKMAR, F. (1931). **Check-list of the Coccidia of Carnivores.**—*Vet. Med.* **26**, 526. [4 refs.]

This list is said to have been compiled from four sources [RASTEGAÏEFF. (1930). *Arch. f. Protistenk.* **71.** 377 ; SPREHN, C., & CRAMER, J. (1931). *Berl. tierärztl. Wschr.* **47.** 261 ; WENYON. (1926). *Protozoology.* **2** ; and YAKIMOFF, W. L., & TERWINSKY. (1931). *Arch. f. Protistenk.* **73.** 56.] Measurements are given in each case. The following parasites form the list :—*Eimeria canis* Wenyon, 1923—dog ; *E. felina* Nieschulz, 1924—lioness ; *E. mesnili* Rastegaïeff, 1930—blue fox ; *E. novowenyoni* Rastegaïeff, 1930—tiger ; *E. sibirica* Yakimoff and Terwinsky, 1931—marten ; *E. vulpes* Galli Valerio, 1929—fox ; *E. hartmanni* Rastegaïeff, 1930—tiger ; *Lucetina bigemina* Stiles, 1891—dog ; *L. canivelocis* Weidman, 1915—swift fox ; *L. cati* Railliet and Rucet, 1891—cat ; *L. felis* Wenyon, 1923—cat ; *L. laidlawi* Hoare, 1927—African fitch ; *L. putorii* Railliet and Lucet, 1891—polecat ; *L. rivolta* Grassi, 1879—cat ; and *L. viverrae* Adler, 1924—civet.

J. E.

JANSEN, J. (1931). Peracute Sterfte bij Eenden, veroorzaakt door Coccidiosis. [**Peracute Mortality in Ducks caused by Coccidiosis**].—*Tijdschr. Diergeneesk.* **58.** 1273-1275.

Coccidiosis in poultry is widespread in Holland and there is a large amount of information available regarding it, but coccidiosis in ducks occurs far less commonly. During the period 1910 to 1930, 1,053 ducks were examined at the Government Serum Institute and coccidiosis was found in three only.

A disease broke out on a duck farm carrying some 700 birds and accounted for a mortality of about 10 per cent. Fowl cholera and duck plague were definitely excluded. Examination of eight birds revealed an enormously heavy infestation with coccidia. Chemical analysis for poisons and particularly for phosphorus yielded negative results.

A. LESLIE SHEATHER.

YAKIMOFF, W. L., & RASTEGAÏEFF, E. F. (1931). Zur Hühnerkokzidiose in Russland (UdSSR). [**Coccidiosis of Poultry in Russia**].—*Zlb. Bakt. I. (Orig.).* **123.** 1-14. 4 figs., 13 tables. [19 refs.]

Although avian coccidiosis is widespread in Russia, there is, according to the authors, except for a few references by SSISOFF, no account of the condition in

Russian literature. They deal at considerable length with the literature before proceeding to the account of their own investigations. The great bulk of the paper is taken up by tabular statements of measurements and semi-diagramatic representations of the parasites encountered.

On the basis of the information obtained the conclusion is drawn that four types of *Eimeria* occur. One of these is *Eimeria tenella* and the other three are said to be new species which the authors name *E. beachi*, *E. johnsoni* and *E. tyzzeri*.

A. LESLIE SHEATHER.

YAKIMOFF, W. L., & RASTEGAÏEFF, E. F. (1931). Zur Coccidiose der Katzen in Russland (UdSSR). [**Feline Coccidiosis in Russia**].—*Arch. wiss. prakt. Tierhlk.* **64.** 160-168. 2 figs., 3 tables. [34 refs.]

The authors record the occurrence of two types of coccidia in a cat in Leningrad which they identify as *Isospora felis* and *I. rivolta*. A considerable part of the paper is taken up by a discussion regarding the views of a number of authors concerning the identity or otherwise of coccidia found in cats. Tabular statements of comparative measurements are given.

Eimeria felina has not as yet been recorded in Russia, but it probably occurs.

A. LESLIE SHEATHER.

SERGENT, E., DONATIEN, A., PARROT, L., & LESTOQUARD, F. (1931). Recherches sur le mode de propagation et sur le réservoir de virus de la theilériose nord-africaine (*Theileria dispar*). [**Research on the Mode of Propagation and Virus Reservoir of North African Theileriasis** (*Theileria dispar*)].—*Ann. Inst. Pasteur.* **47.** 579-600. 10 figs., 1 table. [8 refs.]

Outbreaks of disease due to *Th. dispar* in North Africa commence in June and cease in September. The small blood forms cannot usually be detected after 15 days in an infected animal, but sometimes they persist intermittently for months. It has been proved that ticks fed on a recovered animal, showing this latent infection 15 months after the acute attack, can become infective.

It has not proved possible to transmit the disease with *Rhipicephalus bursa* or *Rh. appendiculatus*. The transmitting agent is *Hyalomma mauritanicum* which will transmit the infection as nymphs or adults if infected as larvae or nymphs. Infection is not passed through the eggs of infected females. In nature the ticks become infected by feeding on an infected host as larvae and nymphs. The nymphs drop off in late autumn and hibernate in the cracks of rocks or buildings. They emerge from these situations to moult in late May or early June. The adults appear to seek their hosts in stables or kraals at night and do not, like the majority of ticks, climb herbage to await a passing host. Young adults are first found attached to cattle in the middle of June.

U. F. RICHARDSON.

BISHOP, Ann. (1931). **The Morphology and Method of Division of Trichomonas.** —*Parasitology*. **23.** 129-156. 2 plates, 1 table. [83 refs.]

Strains of *Trichomonas* from human beings, *Macacus nemestrinus* and *Rana temporaria* were studied. Cultivation was carried out on inspissated horse serum slopes covered with egg white diluted 1 : 8 with Ringer's fluid. Blastocystis

contamination was inhibited by the use of *Bacillus I* (isolated by Dobell and Laidlaw 1926) and starch fermenting organisms by the use of dilute flavine. No method of avoiding coprozoic protozoa was found. Individuals of the same strain were found to show either three or four flagella and the author concludes that this difference cannot be considered of generic importance.

T. batrachrorum of *R. temporaria* was cultivated for two to five months without the appearance of a eutrichomastic stage. Division processes were studied in *T. batrachrorum* and six chromosomes were detected. In *T. hominis* and the trichomonas from *M. nemestrinus* five or six chromosomes were present.

U. F. RICHARDSON.

Thomson, J. G., & Robertson, A. (1932). **The Relationship of Certain Plant and Insect Flagellates to the Sub-genus Strigomonas M. and A. Lwoff 1931.**—*Trans. Roy. Soc. Trop. Med. Hyg. London.* **25.** 287-291. 2 figs. [10 refs.]

Certain flagellates of the latex of plants and the guts of insects, which differ morphologically in their natural habitats but resemble each other in cultures, have been placed by A. and M. Lwoff in the sub-genus *Strigomonas*. These flagellates differ from members of the genus *Herpetomonas* in that the anterior extremity is truncated or cup-shaped and that the flagellum has no cytoplastic sheath. The authors point out that the flagellar movement is also characteristic. The flagellum does not execute lashing movements, but remains relatively set in one shape and rotates rapidly in a circular fashion. They suggest that the flagellates as seen in culture may not represent the morphological alterations of the forms seen in the latex or gut ; there may be a contaminant flagellate which, in culture, swamps the forms seen in nature.

U. F. RICHARDSON.

Schumaker, E. (1931). **Relation of *Balantidium coli* Infection to the Diet and Intestinal Flora of the Domestic Pig.**—*Amer. J. Hyg.* **13.** 576-584. 3 tables. [11 refs.]

Andrews, J. (1931). **Host Specificity in *Balantidium coli*.**—*J. Parasitol.* **18.** 114-115.

Balantidium infection in man is said to be associated with enterocolitis when *Bacillus alkaligenes* is present in the intestines in large numbers. An investigation of 79 pigs showed that heavy balantidium infection was associated with a large number of aciduric organisms in the caecum and a reduction of lactose fermenters and proteolytic anaerobes. A large amount of starch was found in the caecum when heavy balantidium infection existed and the caecal contents were more acid than was the case in mild infections. The author considered that balantidium infection is favoured by a diet high in carbohydrates in the form of grain and that the degree of infection depends on the diet rather than on the bacterial flora.

The second paper was presented at the 7th Annual Meeting, American Society of Parasitologists, New Orleans, 29th, 30th and 31st December, 1931, and deals with the relationship between the balantidia of various animals. *Balantidium coli* of man was transferred to pigs, guinea pigs and rats, but was not transmissible to monkeys, rabbits, cats, dogs or lambs. The organism from the pig was transmissible to guinea pigs, rats and rabbits, but not to monkeys. The evidence presented emphasizes the close relationship between the organisms of man and pig and the possibility of a greater divergence in species from other hosts.

U. F. RICHARDSON.

BOYD, J. S. K. (1931). **Notes on an Outbreak of Amoebic Dysentery occurring among the Hounds of the Bangalore Hunt.**—*J. Roy. Army Med. Corps.* **56.** 1-13. [8 refs.]

The symptoms in the hounds were diarrhoea with the passage of blood-stained mucus. On microscopic examination this mucus contained red corpuscles, epithelial cells, macrophages and amoebae, which could be seen ingesting red corpuscles. The amoebae showed a central karyosome and a ring of fine chromatin granules just under the nuclear membrane. The differentiation of ectoplasm and endoplasm was well marked. The organism thus resembled *Entamoeba hystolytica*. On *post-mortem* examination it was found that the lesions were confined to the large intestine which was congested and, in some cases, exhibited erosion of the mucous membrane. The earliest change was a necrosis of superficial cells with a round-celled infiltration of the sub-mucosa. The amoebae did not penetrate the tissues.

The author concludes that the amoebae were pathogenic, the disease resembling amoebiasis of kittens.

He recommends treatment with saline purges and, in chronic cases, stovarsol (2 grains night and morning). He considers that emetine should be used with caution and that in one case a dose of 1 grain of emetine bismuth iodide appeared to cause death.

No cysts were found in canine stools, but it was found that one of the kennel attendants was passing cysts. He was treated with emetine and the cases in the hounds ceased.

U. F. RICHARDSON.

DISEASES CAUSED BY FILTRABLE VIRUSES.

I. BOYCOTT, A. E. (1931). **Nature of Viruses.** *Nature.* **128.** 727.

II. — (1931). **The Virus Hypothesis.** *Brit. Med. J.* Dec. 19th. 1146-1147.

III. DALE, H. H. (1931). **The Nature of Viruses.** *Lancet.* **221.** 751.

IV. MCINTOSH, J. (1931). **The Nature of Viruses.** *Ibid.* 760.

I. The author discusses General SMUT'S presidential address to the British Association when he stated that the World is constructed on a biological plan, that it is made up of events and that matter, life and mind are three grades of the same thing.

In common thought, inorganic phenomena are quantitatively related to the matter with which they are associated. Mind on the other hand has no perceptible quantitative relations.

Discussing the difficulty some people have in believing that things so small as the causal organism of foot and mouth disease, or bacteriophage can be live organisms, he says, " Cannot life sometimes or partly be more like mind, so that the events of life are quantitatively out of proportion to the perceptible matter involved."

II. The leading article under the above title deals with the work published by GYE and PURDY, " The Cause of Cancer." This book is stated to contain the records of six years' strenuous work in the endeavour to establish various propositions.

It is found that the evidence of the presence of a virus in active filtrates, although still indirect, is very impressive. The close parallel between the mode of action of antiseptics in inactivating tumour filtrates and in killing ordinary bacteria,

or the virus of pleuro-pneumonia, is demonstrated at considerable length. The fundamental fact requiring explanation is the specific character of the transmission in the absence of living cells.

Some five or six filtrable fowl tumours which differ among themselves in histology and in biological behaviour are now known and all breed true when propagated over long periods by cell-free filtrates. Completely desiccated tumour tissue keeps well at a temperature a little above 0° C., but filtrates quickly lose their infectivity on incubation. This rapid deterioration has been studied by GYE and PURDY and by J. H. MUELLER and found to be due to the action of tissue oxidases. The deterioration can be retarded by procedures which inhibit oxidase activity, such as low temperature, anaerobiosis, dilute hydrocyanic acid and cystein.

A suspicion arose that the loss of infectivity on incubation was caused by the destruction of a labile non-living accessory substance originally present in the active filtrate and necessary for infection. Attempts were made to obtain this labile accessory substance free from virus, by the aid of phenol, chloroform, acriflavine or hydrocyanic acid, but the results were inconclusive. No evidence was obtained that the active component derived from the fowl is the factor responsible for the tissue specificity of the filtrates.

III. Dale introduced a discussion from the chair on this subject at the Physiological Section of the British Association. He considers that the viruses form a series, but that we do not know whether the series is real and continuous, or whether it is formed merely by the accidental association, through a certain similarity in effects and through common characteristics, largely of a negative kind, of agents of at least two fundamentally different kinds. He states that we are tempted to assume that all the viruses will ultimately be revealed as independent organisms. The dimensions assigned to the units of some viruses might well make one hesitate to credit them with the power of active self multiplication.

As regards the size of viruses, he considers that it should be remembered that particles that are measured by filters of known porosity, or by microphotographs, need not be assumed to represent the virus organisms in an actively vegetative condition. They may be minute structures adapted to preserve the virus during transmission to cells in which it can resume vegetative life.

The science of bacteriology has given us control of many infective diseases and the author considers that the near future seems likely to give us an epoch of not less important discovery concerning the viruses.

IV. In the address of Professor J. McIntosh to the Middlesex Hospital students on " The Infinite Invisible in Medicine " he speaks of the difficulty of conceiving that anything as small as ultramicroscopic bacteria or viruses could be alive. The smallest of the invisible microbes is large enough to contain a score or more of protein molecules, a number which does not necessarily preclude a virus from being a living agent. It has not yet been possible to show that these viruses have a definite metabolism e.g. respiration etc., comparable to that of ordinary bacteria. So far, the only real test of the presence of these invisible viruses is their power of multiplying in the animal tissues and producing disease.

The fact that these viruses can only live in close relationship with living cells of the animal body suggests that they are much more parasitic than ordinary bacteria ; many appear to live actually inside cells. Further, the tissue cells which are attacked frequently show highly characteristic changes in their protoplasm, with the development of structures known as inclusion bodies. Certain scientists have declared that these viruses are not alive, that they are inanimate and of the nature of a ferment or enzyme, but a ferment cannot increase or multiply. The

viruses multiply in the animal body and call forth specific antibodies, whereas no such bodies follow the injection of ferments.

NORMAN DOBSON.

BABONI, N. (1931). Ricerche sperimentali sull'afta epizootica nelle sue varie manifestazioni epidemiologiche. [**Experimental Research on Foot and Mouth Disease regarding Variations in its Epidemiological Characters**].—*Profilassi.* **4.** 97-104. [17 refs.]

The author describes his observations on an outbreak of a disease resembling foot and mouth disease among young animals in a particular herd. There seemed to have been no opportunity for the infection to have been brought in from outside. The virus appeared to have a predilection for animals of from 8 to 12 months old. It possessed a marked resistance to disinfectants, appeared to be of low virulence and showed only a comparatively weak tendency to spread, but it conferred a presumably high degree of immunity. The disease encountered was possibly not really foot and mouth disease.

A. LESLIE SHEATHER.

FOOY, J. P. (1931). Het Mond- en Klauwzeerhart. [**The Foot and Mouth Disease Heart**].—*Ned.-Indisch. Blad. v. Diergeneesk.* **43.** 500-514. 1 fig. [Summary in English: abst. from orig.]

The author describes an outbreak of foot and mouth disease in which fatal cases occurred in a dairy at Soerabaja. The cases which terminated fatally developed so suddenly that poisoning of some sort was at first suspected. It is probable that the disease was imported with some cattle from Madura. This suspicion was based on the fact that a similarly fatal form of the disease occurred at about the same time among the cattle and pigs on that island in the course of which about 50 animals died.

The typical degeneration of the myocardium was found in the affected animals at *post-mortem* examination. The lesion was characterized by degeneration of the muscular fibres and a round-celled infiltration. It has been held by JOEST that the round-celled infiltration in such cases precedes the degeneration of the muscle fibres, but the author disagrees with this view on the basis of the examination of the hearts of a number of non-fatal cases which were slaughtered. In these cases the degeneration was found, but not the cellular infiltration.

A. LESLIE SHEATHER.

PRUNIER, R. (1931). Utilisation de l'huile de ricin dans le traitement et la prévention de la peste bovine. [**Utilization of Castor Oil in the Treatment and Prevention of Rinderpest**].—*Bull. Acad. vét. de France.* **4.** 153-155.

Castor oil, inoculated subcutaneously, was tested on animals infected with rinderpest and also for its effect on the reactions when mixed with virus and vaccine. The results were somewhat irregular and inconclusive, but there was some indication that, when mixed with formolized vaccine, the same immunity could be produced with a smaller quantity of vaccine than when vaccine alone was administered.

CURASSON, in discussing these experiments, pointed out that the irregular results with the oil-virus mixture might depend on the length of contact prior

to inoculation. Contact for too long an interval might lead to destruction of the virus. He also pointed out that there is no record of the testing of the individual vaccine used and that the good results obtained when the oil was added may have been due to the use of a vaccine of more than average potency.

U. F. RICHARDSON.

I. Andrievsky, P. (1931). Sur la peste bovine atypique et la pluralité du virus. [**Atypical Rinderpest and the Plurality of Strains of the Virus**].—*Rev. gén. Méd. vét.* **40.** 534-539.

II. Curasson, M. G. (1931). Nouvelles recherches sur la peste bovine. [**A Further Investigation of Rinderpest**].—*Bull. Acad. vét. de France.* **4.** 304-310. [8 refs.]

I. Andrievsky could find no evidence that there is more than one strain of rinderpest virus.

II. In view of the claims which have been made of the curative value of chinosol and of gonacrine for the treatment of animals affected with rinderpest, Curasson has tested these drugs and found them to have little if any appreciable influence on the course of the disease.

It was found possible to confer immunity on calves against rinderpest by the inoculation of spleen and lymph gland pulp rendered avirulent by desiccation.

Laboratory and field experience has proved that formolized vaccine confers an immunity against natural infection with rinderpest for about six months, after which period the protection gradually wanes.

The principal objections to formolized vaccine were until recently its cost, the fact that it did not confer immediate protection and the short duration of the immunity conferred.

Curasson has found that the cost of production can be considerably lowered by reducing the dose of vaccine without interfering in any way with the subsequent immunity.

The duration of the immunity conferred by formolized vaccine can be safely increased by the inoculation of virulent blood on the 10th to 12th day after vaccination.

Curasson confirmed the observation first made by Holmes in India that the immunizing value of the serum of animals recovered from rinderpest is little inferior to that of hyperimmunized animals.

T. M. DOYLE.

Král, F. (1932). Virosní anaemie. [**Equine Infectious Anaemia**].—*Zverol. Obzor.* **25.** 81-91.

The author carried out a large series of investigations to ascertain whether equine infectious anaemia is caused by bacteria or by a filtrable virus. The bacteriological examinations of the blood of affected horses failed to reveal the presence of demonstrable parasites. Inoculation with ultrafiltrated blood serum from diseased horses produced an attack of the disease with the same symptoms as those seen in natural cases. From the results of experiments the author concludes that equine infectious anaemia is caused by an ultrafiltrable virus. The blood of affected horses, administered either subcutaneously or intravenously or introduced into the stomach, infects healthy horses. The virulence of the virus increases

during passage. The urine of affected horses is of high virulence. Conditions which lower resistance or create a favourable environment for the development of infection are :—lack of calcium in the food supply, the summer season, age and physical strain. The treatment of equine infectious anaemia is a very difficult problem and consists mostly of the employment of sanitary and hygienic measures and symptomatic therapy.

E. PRIBYL (BRNO).

I. NICOLAU, S., & KOPCIOWSKA, L. (1931). Virus de l'encéphalo-myélite enzootique (maladie de Borna) et électrophorese. [**The Virus of Enzootic Encephalo-myelitis (Borna Disease) and Cataphoresis**].—*C. R. Soc. Biol. Paris.* **108.** 364-366. [1 ref.]

II. NICOLAU, S., & KOPCIOWSKA, L. (1931). Le liquide céphalorachidien dans l'encéphalo-myélite enzootique expérimentale du Lapin (maladie de Borna). [**The Cerebro-spinal Fluid in Experimental Enzootic Encephalo-myelitis (Borna Disease) in the Rabbit**].—*Ibid.* 470-472. [1 ref.]

I. The authors refer briefly to previous experiments made by themselves and others, the results of which indicate that certain neurotropic viruses, those of poliomyelitis, rabies and experimental herpetic encephalitis of the rabbit, carry an electro-negative charge since, when emulsions of tissues containing them are placed in a suitable electric field over a range of pH within which the viruses concerned are stable, they tend to migrate towards the anode.

In preliminary experiments made to observe the migration of the virus of Borna disease in an electric field, an apparatus such as that used by OLITSKY and BOËZ [(1927). *J. Exp. Med.* **45.** 685.] was employed, but owing to unsatisfactory results it was discarded in favour of that described by TODD [(1927) *Brit. J. Exp. Path.* **8.** 369]. The authors, for a reason not made evident, replaced TODD's non-polarizable electrodes, silver foil in a solution of sodium chloride at the anode and copper wire in a solution of bichloride of copper at the cathode, by amalgamated zinc rods in a solution of zinc sulphate at both anode and cathode [see technique in *C. R. Soc. Biol. Paris.* (1930). **104.** 290]. The virus used consisted of the supernatant fluid from a centrifugalized emulsion in physiological saline, buffered at the required hydrogen ion concentration, of the brain of rabbits which had died of the disease. Four experiments were made employing the same technique at a number of points over a range of pH from 5·6 to 7·4. In the two experiments described in detail the E.M.F. of the current employed was 100 to 110 volts and the milliamperage 1·9 to 2·1. This current was passed for a period of three and a half hours. In the three experiments at pH 7·4, 7·2 and 6·6, the virus was only recovered from the anode, while in the fourth, at pH 5·6, a small amount of virus was also recovered from the cathode ; apparently, more virus had migrated to the anode than to the cathode. Owing to the fact that the virus of Borna disease is only stable within a relatively narrow range of pH, and that the virus is damaged by excessive acidity, the authors could not make experiments at a pH below 5·6. From these results the authors feel justified in concluding that the virus particles, or as they tentatively suggest " the particles which serve as a support to the virus," carry an electro-negative charge.

[That only one experiment was made at each pH renders it extremely difficult to draw satisfactory conclusions from their results ; especially is this so with regard to the experiment at pH 5·6. As those who have worked on the subject know, even with the best apparatus at our disposal, the problem is not as straightforward as it would at first appear, and one has to be on the look out for many

disturbing factors, not the least of which is endosmotic streaming which necessitates the greatest care in the removal of samples from above the cotton wool plugs in the respective limbs of the apparatus. Multiplication of experiments is necessary].

II. The authors give the results of their experiments made to determine whether the virus of Borna disease could be recovered from the cerebro-spinal fluid of passage rabbits which had died of the experimental disease produced by intracerebral inoculation. The amount of fluid collected by sub-occipital puncture on *post-mortem* was 0·5 c.c. This fluid, which in the five cases examined was turbid due to the presence of numerous mononuclear cells, was inoculated intracerebrally into two normal rabbits to test for virus. In four cases no virus was recovered from the cerebro-spinal fluid, while in the fifth case some virus was present. That the passage rabbits from which the cerebro-spinal fluid was taken had died of Borna disease was proved by control passages with emulsions of the brain tissue itself and by histological examination.

Several samples of cerebro-spinal fluid taken from animals which had died of Borna disease were examined histologically after staining by Giemsa. In all cases mononuclear cells were found, sometimes in great numbers. Among these cells could be distinguished plasma cells, lymphocytes and macrophages as well as large cells believed to originate from the damaged coverings of the brain and cord. In a foot note the authors refer the reader to a paper on similar, but more complete, series of experiments made with the virus of experimental herpetic encephalitis of the rabbit [(1931). *C. R. Soc. Biol. Paris.* **106.** 1213].

I. A. GALLOWAY.

HELM, R., & WEDEMANN, W. (1931). Die Desinfektionswirkung der Natronlauge bei Schweinepest. [**The Disinfecting Action of Soda Lye in Swine Fever**].—*Arch. wiss. prakt. Tierhlk.* **64.** 208-225. 1 table. [10 refs.]

The authors detail experiments in which cattle trucks, naturally contaminated with the virus of swine fever, were treated with mixtures of caustic soda and milk of lime. The experiments were carried out under varying conditions of temperature and test animals were placed in the trucks at varying periods after the application of the solutions. At summer temperatures, 2 per cent. caustic potash with 1 per cent. milk of lime proved to be effective for the destruction of the virus in 24 hours. At intermediate temperatures, 2 per cent. caustic potash with 5 per cent. milk of lime destroyed the virus within 24 hours, but this mixture was not effective in that period at freezing temperatures.

A. LESLIE SHEATHER.

I. FLYNN, F. C., & MCLAUGHLIN, A. H. (1932). **The Control of Rabies in Kansas City, Missouri.**—*North Amer. Vet.* **13.** No. 5. 44-46.

II. WORTHINGTON, J. W. (1932). **Rabies and its Control.**—*Vet. Bull. U.S.A. Army.* **26.** 103-110.

I. Kansas City, Missouri, was, prior to 1927, one of the areas most infected with rabies in the United States. In January, 1927, a Dog's Ordinance was brought into force to deal with the situation and this called for :—(a) all dogs to be licenced on payment of a fee, (b) vaccination within 30 days previously, (c) the dog to wear on its collar the vaccination mark as well as the licence check and (d) all stray and unlicenced dogs to be destroyed. The ordinance was widely advertised

and the vaccination carried out free of cost by the city veterinary officer. It is estimated that the average number of dogs vaccinated in a year during the period 1927 to 1931 was over 19,000. The authors state that this number represents about two-thirds only of the dogs in the city and, inasmuch as the ordinance did not apply to Kansas City, Kansas, and the rural districts of Kansas and Missouri in all of which rabies is enzootic, the results obtained as shown by these statistics are most encouraging. In 1927, 150 brains of dogs were examined for negri bodies ; 71 were positive : in 1931, only 30 suspected heads were examined and only five of these were positive. Further, the number of people given the Pasteur treatment was 132 in 1927 and this dropped to 32 (one rabid dog was responsible for 15 of this number) in 1930.

II. The effective control of rabies in the United States will rest upon the removal of the dog as a source of infection. It was the intention of PASTEUR to free France from this dreadful disease following his classical researches by vaccinating all dogs annually, but the old method of protection entailed considerable work which would have been inaccurately recorded and it is therefore presumed that his plans were abandoned on those grounds. Recent researches have, however, put at the disposal of veterinarians an efficient single injection rabies vaccine (KELSER) which removes the obstacles that PASTEUR had to face.

It is recommended that a co-operative State and Federal programme of rabies eradication should be undertaken in accordance with those outlined in I, with the exception that each animal should be permanently identified by a recognized system of tattooing instead of the use of metal tags to be worn on the collar. This system has been carried out at army posts with marked success.

H. V. M. METIVIER.

YOUNG, H. W. (1931). **Canine Distemper.**—*Vet. Med.* **26.** 489-491.

PYLE, N. J. (1931). **Present Status of Canine Distemper Prophylaxis.**—*North Amer. Vet.* **12.** No. 9. 39-42. [4 refs.]

The first of these articles is a clinical description of the disease as observed by the author in " a small animal hospital " and the second is a brief review of the results obtained in America by the use of the vaccine-virus method of prevention of the disease.

Under the heading " treatment," Young describes the treatment adopted for various symptoms as they arise, but every case receives " a mixed bacterin canine " repeated three or five days later, an alkaline compound to allay acidity, a large dose of homologous serum and a diet of animal protein. It is further stated that " a sure way to prevent distemper has not been discovered," but that, by the use of the simultaneous serum-virus method, 61 per cent. of animals were immune, whereas 87 per cent. of those which received vaccine followed by virus developed distemper on the fourth or fifth day after the injection of virus.

This last statement is not in accordance with Pyle, who is in agreement with the English workers that vaccine alone produces a temporary resistance only and that living virus must take some part in the process of immunization if the subsequent immunity is to be lasting. The Lederle Laboratories have never issued virus other than in the dry state and Pyle describes the method adopted for its preparation. The article concludes with a statement concerning the results obtained in America which appear to be satisfactory.

G. W. DUNKIN.

Bubberman, C., & Kraneveld, F. C. (1931). Over een besmettelijke peristomatites bij Schapen. [**An Infectious Peristomatitis in the Sheep**].—*Ned.-Indisch. Blad. v. Diergeneesk.* **43.** 564-592. 2 plates, 5 tables. [12 refs.]

After reviewing the literature—and it may be noted that the first reference to this condition appears to have been made in 1922—the authors proceed to an account of their investigations connected with the disease.

Histologically the lesion is a thickening of the superficial layers of the epithelium of the skin around the lips, with crust formation. The lesion does not appear to go deeper than about the middle of the epithelium. The corium and subcutis appear to be perfectly normal, except that the former may show a round-celled infiltration. Transmission experiments and contact experiments were carried out with filtered and with unfiltered materials and these furnished evidence that the condition is due to a filtrable virus. It is possibly identical with that described by Bïëckli as contagious pustular stomatitis. The authors point out, however, that in the lesions occurring on the lips the vesicular stage of the disease was not seen. In experimentally infected animals, which were inoculated on the thin skin in the inner side of the thighs, this stage was detected.

Recovery leaves a condition of immunity and it would therefore appear that protective inoculation is a possibility.

A. LESLIE SHEATHER.

Beller, K. (1931). Was muss der Tierarzt bei der Schutzimpfung gegen Geflügelpocken beachten ? [**What must the Veterinary Surgeon observe in the Protective Inoculation against Fowl Pox ?**].—*Berl. tierärztl. Wschr.* **47.** 615-618. 4 figs. [16 refs.]

Experience has shown that in inoculating poultry against fowl pox certain precautions must be observed if difficulties are to be avoided. When inoculations are being carried out on infected premises it must be borne in mind that some weeks are required for the establishment of immunity. If this is not explained to the owner he may feel that the inoculation is not of value and he may entertain false hopes about the immediate control of the disease. The presence of a nasal catarrh which has not been definitely established as a manifestation of fowl pox is also likely to lead to some difficulty unless the matter is explained to the owner.

Care must be exercised in not confusing the lesions resulting from a deficiency of vitamin A in the diet. In this condition secondary bacterial infection may lead to the production of a diphtheria-like condition. The primary abnormality is the production of necrotic nodules in the throat and oesophagus. The condition may spread to the eyes and head and produce a purulent discharge from the eyes and nose accompanied by swelling of the head.

Inoculation may sometimes produce nasal catarrh of a benign character which, however, causes the owner considerable concern. The benign character of the condition must be explained and it should be pointed out that the lesion is not an indication of a defective vaccine, but of an active one. Unsatisfactory results may follow the inoculation if the vaccine is not thoroughly rubbed into the hair follicles, or if the dried virus has not been properly prepared before it is used. Fowl pox viruses vary very much and standardization is desirable. Up to the present no standardization has been found possible.

A. LESLIE SHEATHER.

STUPPY, C. (1931). Uebertragung von Hühnerpocken durch Mücken (Vorläufige Mitteilung). [**The Transmission of Fowl Pox through the Medium of Flies. Preliminary Publication**].—*Zlb. Bakt. I. (Orig.).* **123.** 172-178. 6 figs. [13 refs.]

The experiments recorded in this paper were designed as an amplification of those published by KLIGLER, MUCKENFUSS and RIVERS in 1929 regarding the possibility of transmitting fowl pox by the bites of *Culex* and *Aëdes*. In particular it was the aim of the experiments to determine whether the transmission was a purely mechanical one or not. The insects used were *Culex pipiens* and *Stegomyia fasciata*.

Details are given of the manner in which the insects were fed upon infected birds and subsequently used for transmission experiments to healthy ones. Both species were found to be capable of transmitting the infection, and they retained this power for periods up to 39 days after the infecting meal on a diseased bird. Up to this period (the duration of the experiments), the flies showed no reduction in their infectivity and it is possible that they remain infective for life. The period of incubation following the bites ranged from six to ten days.

It is improbable that the infection resulting from a bite 39 days after the infective meal is due to contamination of the proboscis with the original infective material, as the flies were fed with sugar-water during the interval. Further, the inoculation of birds with an emulsion of flies from which wings, legs and proboscis had been removed, had a positive result. It would therefore seem to be certain that the infective material was contained in the fly.

Birds reacting to the bites of the flies acquired immunity.

A. LESLIE SHEATHER.

GOODPASTURE, E. W., & WOODRUFF, E. E. (1931). **A Comparison of the Inclusion Bodies of Fowl-pox and Molluscum Contagiosum.**—*Amer. J. Path.* **7.** 1-7. 6 figs. on 1 plate. [12 refs.]

The inclusion bodies of *molluscum contagiosum* can be freed from surrounding cellular material by tryptic digestion and the bodies so freed are " sticky " and gelatinous. This gelatinous matrix has a granular appearance owing to the presence in it of Lipschütz granules which resist the action of trypsin. The granules in *molluscum contagiosum* appear to be identical with those of fowl pox. They are of the same size and possess the same staining reactions. The inclusion bodies of the two diseases differ somewhat in their behaviour in distilled water. Whereas those of *molluscum contagiosum* show little or no swelling, those of fowl pox swell to a marked extent. The granules also differ in that those of *molluscum contagiosum* are readily separated into the component Lipschütz granules while those of fowl pox are not separated ; this possibly explains the greater filtrability of the virus of the former.

No evidence of cross-infection or cross-immunity could be obtained.

A. LESLIE SHEATHER.

LAGRANGE, E. (1932). Etudes sur la peste aviaire d'Egypte. [**Fowl Pest in Egypt**].—*Ann. Inst. Pasteur.* **48.** 208-267. 3 text figs., 2 tables. [34 refs.]

In this article the author has collected the results of his published experiments on fowl pest which he has supplemented with some fresh observations. He considers that the Egyptian disease, notwithstanding its identity by cross-immunity

experiments with classical strains, should be regarded as a peculiar type on account of its longer period of incubation and its extreme infectivity by contact and by ingestion. In Egypt, the disease has a definite seasonal occurrence from December to June and is rarely seen during the rest of the year.

It had been suspected that lice might act as vectors of the virus, but experiments indicated that they were incapable of transmitting infection. The sparrow was susceptible to infection and, after two to four passage experiments through this species, the virus was still of full virulence for the fowl.

It was found that virulent blood would retain its infectivity in sealed tubes in the cold room for more than 25 months.

There was no evidence of the existence of a natural immunity to the disease and the mortality approached 100 per cent.: nevertheless, it was possible to detect occasional healthy carriers of the virus which, incidentally, were not immune to the disease. An acquired immunity could be induced by the injection of two doses of virulent brain or testicle attenuated by desiccation for six and three days respectively. Dried spleen was impotent as a vaccine, but formolized or glycerinized spleen gave a perfect immunity. Vaccines prepared from the liver were always inactive in this respect. Occasionally, at the time of death when the other organs were fully virulent, the brain was avirulent, but was capable of producing an immunity, although this effect was somewhat inconstant.

During the course of epizootics it was found that there were marked variations in the tenure of virus in the different organs and the author postulates the existence of an antagonistic principle with a seasonal periodicity which was capable of neutralizing or inactivating the virus. Immunized fowls could be reinfected with large doses of the virus, but in these cases the infective agent was usually confined to the brain. Experimentally, it was possible to set up the disease serially in a number of birds, but eventually the epizootic subsided although the virus had not lost its virulence.

R. E. GLOVER.

I. FURTH, J. (1931). **On the Resistance and Filtrability of the Agent transmitting Leucosis.**—*Proc. Soc. Exp. Biol. New York.* **28.** 985.

II. STUBBS, E. L., & FURTH, J. (1931). **Relation of Age and Breed to Susceptibility in Leucosis of Fowls.**—*Ibid.* 986-987.

III. CRANK, R. P., & FURTH, J. (1931). **Fate of Leucemic Blood of Fowls after Transfusion.**—*Ibid.* 987-989.

I. Blood cells preserved in 50 per cent. glycerol for 104 days produced leucosis after an incubation period of from 35 to 82 days when a 0·5 c.c. dose was inoculated into three out of four fowls, whereas the incubation period was from 12 to 45 days after inoculation with fresh blood. Blood dried rapidly *in vacuo* over sulphuric acid and stored at +4° C. for 15 days, when inoculated into three fowls, caused leucosis from 34 to 45 days later.

Plasma passed through a coarse filter and then through a Berkefeld W caused leucosis in two out of four fowls, whereas unfiltered plasma caused leucosis in two out of three inoculated fowls. The method of inoculation is not stated.

II. According to ELLERMANN and BANG, leucosis of fowls is not transmissible to guinea fowls, doves or turkeys.

Using only 18 birds in three groups of different ages, it is indicated that older birds are less susceptible to transmissible leucosis than younger birds.

Out of groups of six, four to five months old birds, inoculated intravenously with 0·6 c.c. of leucaemic blood, four Barred Rocks, four White Leghorns, two

Rhode Island Reds and two of mixed breed acquired leucosis ; six bantams similarly inoculated also became infected.

III. Six young chicks were each transfused with from 20 to 35 c.c. of blood from fowls with severe myeloid leucaemia. Following the transfusion there was an immediate increase of the leucocyte count which returned to normal in the course of a few days in most birds. In two chicks however there was a rapid rise in the number of circulating leucocytes and both birds died in three days from leucaemia. A further batch of chicks were injected intravenously with 0·5 c.c. of the blood of a fowl with severe myeloid leucaemia.

These experiments show that the transmissible agent is demonstrable in the blood stream of the recipient 30 minutes after inoculation. Most if not all of it leaves the circulation within 24 hours and reappears within 7 to 15 days in fowls that develop leucosis.

The authors state that the present study indicates that the leucaemic cell itself is capable of autonomous growth.

NORMAN DOBSON.

HILGERS, P. (1931). Kann formolisierte Lymphe zur Pockenschutzimpfung Verwendung finden. **[Can Formolized Lymph be used for Vaccination against Smallpox]**.—*Zlb. Bakt. I.* (*Orig.*) **123.** 178-183. 4 tables. [17 refs.]

A number of investigators have tested the possibility of using lymph subjected to heat and various disinfectants, but the results have not been concordant. Hilgers has used 0·3 per cent. formol in lymph diluted 1 in 4 with water or salt solution and has incubated the mixture at 37° C. for five days. He found that exposure of the lymph to 0·3 per cent. formol for five days at 37° C. was capable of killing it, but that the formolized vaccine still possessed some antigenic properties which could be demonstrated experimentally in rabbits. It was, however, only in a minority of the rabbits used that a satisfactory degree of immunity was established.

In consequence the author concludes that formolized lymph cannot be considered for the vaccination of human beings.

A. LESLIE SHEATHER.

I. MORISON, J. (1931). **Bacteriophage and the Cholera Problem.**—*Brit. Med. J.* Nov. 14th. 899-900.

II. VERGE, J., & VALLÉE, M. (1931). Le traitement des diarrhées des veaux par le bactériophage. **[Treatment of Calf Dysentery by Bacteriophage]**.—*C.R. Acad. Sci. Paris.* **192.** 454-456.

I. This is a report of a paper on bacteriophage, in relation to cholera and dysentery, read by Morison at the Edinburgh branch meeting of the Royal Society of Tropical Medicine and Hygiene. The features of bacteriophage action were described and the lecturer, in referring to the different views on the nature of the agent, stated that he considered D'HÉRELLE'S conception of the bacteriophage as an " independent living organism " to be a useful working basis. He spoke of BAIL and WATANABE'S now well-known and important work on the classification of phage types. By their technique they were able to report the existence of five phage types capable of lysing *B. dysenteriae* Shiga. [Phages are considered to be of the same type when each produces bacterial forms that are simultaneously resistant to all other phages of the group. The method of classification is identical in principle to " cross immunity " experiments in animals to determine virus

types as in foot and mouth disease, for example, and the result is a well-defined division of phages into types.] Some of the difficulties encountered in classification of phage types are discussed. Differentiation of phage types lysing Flexner and Y types of *B. dysenteriae* is not so easy, for example, as with phage types lysing Shiga cultures. It is evident that the action of a multi-type phage may be very different from that of a polyvalent one. Recently ASHESHOV and his co-workers have defined and described three types of cholera bacteriophage which they call A, B and C.

MORISON and VARDON have prepared what is now known as the " Shillong " therapeutic phage (Shillong, Assam). This is a mixture of cholera and dysentery phages prepared from many " natural " phages grown on a number of strains of cholera vibrio and dysentery bacilli. The methods employed secure the presence in the mixed phage of as many types as possible. The use of the Shillong therapeutic phage was believed to be justified for village use ; early cases of cholera were frequently mistaken for dysentery and *vice versa*. Some epidemiological facts of importance are discussed. Study of village epidemics and of their treatment by bacteriophage had indicated that the method might possibly arrest them. Further, the author considered that, as D'HÉRELLE suggested, the first cases treated with bacteriophage in an epidemic might disseminate bacteriophage as they ordinarily disseminate the cholera vibrio.

II. According to the authors calf dysentery is usually due to especially pathogenic strains of *B. coli*. They demonstrated the presence in the intestine of convalescent animals of a specific bacteriophage. The virulence of this phage was exalted by passage in series *in vitro* and its lytic properties extended by adaptation to numerous strains of *B. coli* isolated from the excreta of infected calves. The mixed bacteriophage thus obtained was distributed to a number of practitioners in different regions of France for the therapeutic treatment of cases of calf dysentery. The method of administration advised was as follows :—(1) replace a milk diet during the first two or three days of treatment by one consisting of linseed tea and barley or rice water and (2) give by the mouth 10 c.c. of bacteriophage morning and evening and continue the treatment for five to six days.

Details of the results obtained by several of the practitioners are reported. The authors summarize the results obtained as follows :—" Improvement in treated cases generally takes place on the second or third day. The diarrhoea diminishes and ultimately ceases and the appetite and general condition of the animal considerably improve until complete recovery takes place." One deduces from the authors' remarks that all the reports of the results obtained were not as good as the ones they selected for publication. They attribute failure in treatment to the existence or development of strains of *B. coli* resistant to lysis. Further, the beneficial effect of treatment with a bacteriophage active against *B. coli* is not to be expected in cases of dysentery due to *B. tuberculosis*, Johne's disease, paratyphoid infections or coccidiosis. They add that the administration of intestinal antiseptics and febrifuges during the course of treatment with bacteriophage is distinctly contra-indicated.

I. A. GALLOWAY.

DISEASES CAUSED BY METAZOAN PARASITES.

CRAM, Eloise B. (1932). **Recent Advancement in our Knowledge of Poultry Parasitism.**—*Vet. Med.* **27.** 30-34. [28 refs.]

In 1928 the author published a summary of the status of our knowledge of

poultry parasitism at that time and, in the present paper, gives a brief account of subsequent progress in this branch of parasitology. Particular mention is made of work on avian coccidiosis, on a new species of pathogenic *Trichomonas* in turkeys, contributions on the association between vitamin deficiency and parasitism, further work on the part played by wild birds in the dissemination of gapes and contributions to our knowledge on the life histories of cestodes, trematodes and nematodes.

E. L. TAYLOR.

SMIT, H. J. (1932). Een bijzonder Gastheer. **[A Peculiar Host].**—*Ned.-Indisch. Blad. v. Diergeneesk.* **44.** 174.

In a cat brought to the clinic of Buitenzorg Veterinary College the following parasites were found at autopsy :—*Notoëdres cati* on the head, *Chlamydonema felineum* Noordhoek-Hecht in the stomach, and *Taenia elliptica* Batsch, *T. crassicollis* Rud, *Dibothriocephalus* sp., *Belascaris mystax* Zeder and *Ancylostomum ceylanicum* Looss in the intestine.

J. E.

I. MCCOY, O. R. (1931). **Immunity Reactions of the Dog against Hookworm (*Ancylostoma caninum*) under conditions of Repeated Infection.**—*Amer. J. Hyg.* **14.** 268-303. 14 tables, 7 graphs. [19 refs.]

II. MCCOY, O. R. (1931). **The Course of Experimental Trichiniasis Infections in Rats.**—*J. Parasitol.* **18.** 123.

III. MILLER, H. M. (1931). **Superinfection of Cats with *Taenia taeniaeformis*.**—*Ibid.* 126.

IV. SCHWARTZ, B., ALICATA, J. E., & LUCKER, J. T. (1931). **Delayed Development of a Rat Nematode in Successive Infections.**—*Ibid.* 129.

Papers II, III and IV were presented at the 7th Annual Meeting of the American Society of Parasitologists, New Orleans, 29th, 30th and 31st December.

I. This paper is a report of the study of infections with *Ancylostoma caninum* in 25 dogs and 6 cats when doses of larvae were repeated at intervals over a prolonged period. The course of the infection in dogs was traced by the egg count, by the recovery of adult worms passed in the faeces and by the haemoglobin content of the blood. No observations were made on worms passed in the faeces, nor on the haemoglobin content of the blood in the cats.

The author summarizes the observations on the dogs as follows :—

" In the six cases of heavy infection the egg count rose rapidly during the first three months to a peak of several million eggs per day. The dogs became very anemic the hemoglobin dropping as low as 25 per cent. Two dogs succumbed to the heavy burden of parasites but in four others a crisis occurred at this point and the egg count suddenly dropped to a comparatively low level even though large doses of larvae were still being given. At the same time large numbers of adult worms were passed in the feces and the hemoglobin gradually rose to normal. The fact that at the height of their infections these dogs not only resisted the development of more larvae but also threw off the majority of the worms already established is interpreted as an immunity reaction on the part of the host.

" This immunity was not absolute because two of the dogs after losing their infections were subsequently given second and even third infections which were thrown off in the same manner and more rapidly than the first."

It was considered that the factor of age immunity in the interpretation of the results was eliminated by the use of control animals from the same litters as the

experimental animals and by the observation of similar results in mature animals which had already reached the age of resistance.

The experimental cats showed a similar reaction to the cat strain of *A. caninum*, developing an increased resistance which was apparently distinct from age resistance.

The egg production per female worm in the ten resistant dogs was found to be only about one third of the normal figure.

It is noted that STRUMBERG tested a number of the repeatedly infected dogs for antibodies, but was not able to demonstrate their presence.

II. This is the report of a series of experiments which show that where few trichinae are fed to rats (approximately 10 per gramme of rat) the adult worms are lost from the intestine in about two weeks, but where a larger number are fed (about 40 per gramme of rat), the adults remain in the intestine for three to four weeks. It was also shown that the ratio of the total number of larvae which developed in the muscles to the number originally fed was higher where the initial feed was greater, indicating the presence of host-resistant factors which were broken down when the infective dose was a large one.

III. This author has previously shown that the rat is immune to super-infection with the larval stage of *Taenia taeniaeformis* and in this paper he reports a series of experiments on cats showing that the presence of mature worms in the intestine of these animals does not confer protection against subsequent infection.

IV. These authors demonstrated that rats which have recovered from an infection with *Nippostrongylus muris* are resistant to a second infection. This is shown by the slower rate of development of the parasites ; many do not reach the intestine (being arrested in the lungs) and those which do so require a longer time to reach the maximum size and to produce eggs.

E. L. TAYLOR.

McCOY, O. R. (1930). **The Influence of Temperature, Hydrogen-Ion Concentration and Oxygen Tension on the Development of the Eggs and Larvae of the Dog Hookworm,** *Ancylostoma caninum.—Amer. J. Hyg.* **11.** 413-448. 4 figs., 10 tables. [15 refs.]

Practically all the studies on the biology of the free-living hookworm larvae have been carried out on faeces cultures and it is probably the variable nature of the medium which has resulted in the discrepancies in the observations of various investigators. The author has previously demonstrated that living bacteria form the essential food of hookworm larvae and in the work which is here reported he has used larvae reared on pure cultures of *Bacillus coli*, hoping thereby to obtain more reliable results.

Observations on the growth of larvae at various temperatures showed that, at 15° C., 17 to 22 days are required to reach the infective stage ; this was found to be the minimum temperature for development. At 37° C., the maximum temperature for development, the infective stage was reached in 48 hours, the shortest period which has so far been observed. 30° C. is considered to be the optimum temperature.

Observations made on the effects of hydrogen-ion concentration of larvae reared in suspensions of bacteria in buffer solutions of various pH suggest that this factor is not of great importance to their development. Larvae reached the infective stage in solutions ranging from pH 4·0 to pH 10·0 and little difference could be seen between the results obtained in culture media of a pH varying from 6·0 to 9·4. The failure of larvae to reach the infective stage in faeces cultures

having an acid reaction must therefore be attributed to some factor which is associated with the acidity and not to the acidity itself.

Studies on the oxygen requirements revealed that eggs will develop at oxygen tensions as low as one-fifteenth of the amount ordinarily dissolved in water. The oxygen consumption of infective larvae was found to increase about 9 per cent. for each rise of 1° C. A high tension of oxygen, from 30 c.c. per litre, completely inhibits the development of the eggs.

E. L. TAYLOR.

SCOTT, J. A. (1930). **Further Experiments with Physiological Strains of the Dog Hookworm,** *Ancylostoma caninum.—Amer. J. Hyg.* **11.** 149-158. 3 tables. [6 refs.]

This author has previously described two physiological strains of *Ancylostoma caninum* ; 50 per cent. of the one strain was found to mature in dogs, but only 5 per cent. in cats and, of the other strain, 45 per cent. matured in cats, but less than 1 per cent. in dogs.

The present paper gives an account of experiments made to ascertain the stability of the two strains. Information was obtained by cross-infection which suggests that the dog strain cannot easily be made more infective for cats or less so for dogs, but that the cat strain may, by passing a generation in the dog, become better adapted to that host.

Attempts to hybridize the two strains by feeding immature males of the one and immature females of the other to the same host were not successful, but it is considered that these trials were inconclusive and that further attempts may succeed. The results obtained in the establishment of infestation by the transfer of immature adults were very variable, even when it was made from one susceptible host to another, but it was clearly shown that the peculiar adaptation of the cat and dog to their two relative strains was not so pronounced for immature adults as for the infective larvae.

E. L. TAYLOR.

HOFFMAN, W. A. (1931). **Gapeworm in Man.**—*Porto Rico J. Publ. Health & Trop. Med.* **6.** 381-383. 1 plate. [9 refs.]

The author records a case of the infestation of a human being with a single pair of *Syngamus laryngeus* normally a parasite of bovines. The infestation was contracted during a visit to a farm and caused a more or less continuous cough. This is the fourth record of this worm being found in a human being.

T. W. M. CAMERON.

BROOKS, F. G. (1930). **Studies on the Germ Cell Cycle of Trematodes.**—*Amer. J. Hyg.* **12.** 299-340. 4 figs., 7 plates, 2 charts. [72 refs.]

The exact nature of the life history of the digenetic trematodes cannot be thoroughly understood until a minute study of the germ cell has been made, covering the complete cycle from fertilized egg to fertilized egg. The cercaria-producing sporocyst or redia is considered to be the most significant stage and an attempt has been made to elucidate the developmental cycle by careful cytological study of 20 different species of trematodes at this stage. A short account is given

of the author's technique and his observations on each one of the species are set out in detail.

A particularly careful search was made for polar bodies or other maturation phenomena, but they could not be found. The author believes that he has been able to recognize the several structures which have been described as polar bodies by various other workers and his observations on these are given. No structure could be found in the sporocyst or redia which might be interpreted as an ovary, but early germ cells were found and cleavage was observed to take place free in the body cavity of very young sporocysts and rediae.

These observations enable the author to discard several of the theories which have been put forward to explain the life cycle of trematodes and to interpret it as one where " the germinal lineage passes through successive larval stages in which polyembryony features as a mode of multiplication and in which precocious cleavage of the germ cells is an activating factor." The early germ cells, in undergoing precocious cleavage in the sporocyst or redia, are thought thereby to retard the somatic development so that little more than a cyst wall appears. After the rediae and daughter rediae have been formed, however, the germ cells lose this tendency to precocious development, probably on account of their greater physiological age, and somatic development is allowed to proceed normally to the production of the perfect larva, i.e. the cercaria.

E. L. TAYLOR.

CAMERON, T. W. M. (1931). **Experimental Infection of Sheep with *Dicrocoelium dendriticum*.**—*J. Helminthol.* **9.** 41-44. [2 refs.]

Sheep in several parts of the West of Scotland are infected with *Dicrocoelium dendriticum*. A survey of the possible intermediate hosts on the island of Tiree, where the sheep were infected, showed that two species of land snail, *Helicella itala* and *Cochlicella acuta*, were particularly abundant. A number of specimens of these were collected and fed with the eggs of *D. dendriticum*. Feeding commenced on April 18th, 1930, and cerceriae were first found on June 23rd. Infected snails were fed to two test sheep in June and July and the eggs of *D. dendriticum* appeared in the faeces towards the end of November.

The cercaria experimentally obtained in these snails appears to be identical with *C. vitrina*, which has recently been described by NÖLLER as originating from *Zebrina detrita* and *Torquilla frumentum*, and by VOGEL as originating from *Helicella candidula* and *Zebrina detrita*.

E. L. TAYLOR.

DISEASES, GENERAL.

BRICAIRE. (1931). Séméiologie digestive du Cheval et des Bovidés. [**Digestive Semeiology in Horses and Cattle**].—*Rec. Méd. vét.* **107.** 596-603. [4 refs.]

This article deals with the nervous connection between viscera and superficial areas of the body. In some internal disorders, particular areas of the skin often show certain appearances which may take the form of " hair on end," localized heat or cold, muscular twitching, perspiration, hyper- or hypo-aesthesia.

This phenomenon has been elaborated for many years with regard to human beings ; with regard to the veterinary aspect the author quotes ROGER (1916), who worked out the nature of a " clavier équin," also CHAPRON (1925) and

Nieder (1925), who reported that, in the horse, gastric disorder is associated with sweating in the region of the neck and shoulders.

The author gives two case records in which he observed (1) that in a horse with colic there was twitching of the lower parts of the intercostal muscles (ribs 9 to 14) of the left side associated with gastric indigestion and (2) that in a cow, a staring coat extending over the base of the neck, shoulders and sides of the chest, but stopping short of the flanks, was associated with disorder of the stomach and small intestine.

J. E.

Harris, L. J., & Innes, J. R. M. (1931). **The Mode of Action of Vitamin D. Studies on Hypervitaminosis D. The Influence of the Calcium-Phosphate Intake.**—*Biochem. J.* **25.** 367-390. 2 plates, 15 text figs. [77 refs.]

A lengthy study of the influence of variations in the calcium and phosphate intake upon the abnormalities resulting from overdoses of irradiated ergosterol. The experiments were carried out on rats, using a modification of Steenbock's rachitogenic diet [omitting the calcium carbonate] with varying graded additions of calcium phosphate. In comparing natural and synthetic diets with varying calcium and phosphorus contents, a basal diet of bread and milk was also used.

Two papers by one of the authors of the present article (Innes), upon the pathology of hypervitaminosis D have recently been abstracted in this *Bulletin*. **1.** 312., but the conclusions now reached from the biochemical side may be summarized as follows :—

(1) An increase in the calcium content of a diet, or in the Ca/P ratio over certain ranges, intensifies the hypervitaminosis due to overdoses of irradiated ergosterol. It also gives rise to an increased formation of calcareous deposits at a given level of vitamin D excess. With diets virtually devoid of calcium and phosphorus, on the other hand, a hypervitaminosis of distinctive character can still be produced provided that the level of vitamin D excess is sufficiently raised. Under these conditions calcareous deposits are not in evidence but there is a greatly increased resorption of bone substance.

(2) X-ray and histological examination of the bones showed that in normal diets large doses of vitamin D stimulate osteogenesis, and a densely calcified overgrowth appeared at the growing end of the bone—in contrast with rickets. In advanced degrees of the hypervitaminosis, resorption was extensive, and the cortex of the shaft and other compact bone became spongy. Vitamin D excess also gave rise to a remarkable overgrowth of dental cement in the growing animal.

(3) In explanation of results it is shown that feeding of excess of vitamin D gave rise to a raised blood calcium or blood phosphate or to both, with a tendency to deposition of calcium in certain sites, just as vitamin D deficiency gives rise to lowered calcium or phosphate or both and accompanying inadequate calcification. The extra calcium and phosphate may be derived by increased net absorption from the gut or increased withdrawal from bony stores. Vitamin D therefore has a distributive action. In the hypervitaminosis produced upon diets rich in calcium with moderate overdoses of vitamin D the increased absorption, or decreased elimination, from the gut, is the factor of special consequence. With calcium deficient diets and with larger excesses of the vitamin, withdrawal from the bone shaft is the main source. In some respects the mode of action of vitamin D stands in contrast to that of the parathyroid hormone, since the latter raises blood

calcium solely by withdrawal from the bones and without increasing net absorption from the gut.

(4) While the addition of vitamin D to the diet tends to raise the blood calcium, or the blood phosphorus since one influences the other, the actual level attained is the resultant of several factors. Operating in one direction is the increased absorption (or decreased elimination) and the dissolution from certain sites, and in the opposite direction is the deposition in other sites and increased urinary excretion. With increasing doses of vitamin D the retention by the animal as a whole first rises but ultimately falls, the kidney excretion overtaking the gut absorption.

[The chief interest of this paper to the veterinarian lies in the fact that there are millions of acres of utilizable pasture land throughout the British Dominions upon which deficiency of phosphorus or calcium, or of both, in the natural vegetation, is the limiting factor in the economics of the live-stock industry [see abstract of 35 papers from South Africa, this *Bulletin*. **2.** 168 ; abstract of paper by THEILER, *Ibid*. **1.** 313 ; views of MCCARRISON and RANGANTHON, *Ibid*. 311.

Although it is a far cry from laboratory rat to cattle and sheep under ranching conditions, and although the differences in requirements of vitamins and minerals are very different for the rat and the ruminant, any researches dealing with the inter-relationships between Ca, P, and vitamin D are of interest as suggesting lines of further investigations in connection with economically important stock diseases. Osteomalacia and rickets of the bovine and ovine are wide-spread, e.g. " styfsiekte " and " lamkruis " of South Africa, " cripples " and " osseous cachexia " of Australasia and quite probably the " croitich " of Scotland, and although these diseases are now regarded as mainly due to phosphorus deficiency, much work still remains to be done in relation to the ratios between Ca, P, and vitamin D or exposure to sunshine].

H. H. GREEN.

ROLLESTON, H. (1931). **Hepatic Efficiency.**—*Lancet*. **221.** 1227-1228.
DODDS, E. C. (1931). **Tests of Hepatic Function.**—*Ibid*. 1228-1230. [2 refs.]
—. (1931). **Methods of determining Liver Function.**—*Ibid*. 1238-1239.
—. (1931). **Liver Function Tests.**—*Brit. Med. J*. Dec. 5th. 1038-1039.

All the above papers relate to a discussion on hepatic function organized by the London Medical Society and they are probably already somewhat abbreviated.

Sir H. Rolleston emphasizes the complex nature of the hepatic functions and their great interconnection with functions of other organs. Any one of the functions may be deranged without necessarily upsetting the other functions and hence, either tests must be made for each individual function or some new comprehensive test must be devised to assess total hepatic function. Four fifths of the liver may be experimentally removed and the animal remain healthy. Functional tests are more reliable in acute lesions of the liver.

Professor Dodds summarizes the work of F. C. MANN *et alia* on liver function. After the complete removal of the liver, dogs behave normally for several hours, then develop muscular weakness rapidly and usually soon die in convulsions. The symptoms of carbohydrate disturbance can be relieved for a time by the administration of glucose. The presence of abnormal quantities of uric acid and amino acids in the blood indicates that protein metabolism is also upset. The experiments clearly showed that the liver is concerned with carbohydrate and

protein metabolism and with bile secretion, but no evidence was obtained in favour of the antitoxic and haematopoietic functions ascribed to that organ. Very few tests are of real value. The galactose tolerance test is useful in very early cases of jaundice and the estimation of bile pigments, if carried out daily, acts as a useful guide to the progress of jaundice. It is essential that a new outlook be arrived at where liver functions and tests are concerned. Possibly the classification of jaundice into the following two types will facilitate this change—retention jaundice, associated with conditions which render the excretory power of liver subnormal and regurgitation jaundice, associated with the reflux of whole bile from the canaliculi into the blood stream.

Among the many interesting views put forward in the discussion the following points may be cited. The van den Bergh test and the icterus index are of value in liver disease. The former test is of particular value in diagnosing damage to the liver from salvarsan injections. The galactose test is of little use except in conditions associated with jaundice, whether catarrhal or obstructive.

W. R. WOOLDRIDGE.

I. Horral, O. H. (1931). **The Toxicity of Bile.**—*Physiol. Rev.* **11.** 122-142. [106 refs.]

II. Ziegler, A. M., & Orr, T. G. (1931). **Chemical Changes in the Blood of the Dog in Experimental Bile Peritonitis.**—*J. Exp. Med.* **53.** 865-868. [3 refs.]

I. The first paper is a review of the literature on the toxicity of the constituents of the bile, undertaken with the object of assisting investigation of the relation of bile to disease.

The literature is considerable, but the evidence conflicting, and decisive further research is indicated. The author's own conclusion is that the bile acids are toxic, but that bilirubin and the better known bile pigments are not.

Sodium taurocholate is indicated as somewhat more toxic than sodium glycocholate, although the lethal dose is fairly high in both cases—the figures of Rywosch for the frog being 70 mg. and 100 mg. respectively.

In jaundice the actual increase of bile pigments in serum and tissues does not necessarily run clinically parallel with the toxic symptoms and the pigments themselves are not the cause of the intoxication.

There is no evidence that resorbed urobilin is toxic and other constituents such as cholesterol have been injected in large amounts (0·5 g. per dog) without effect. Mucin is added after the bile leaves the liver and serves to protect the biliary passages.

The bile contains numerous constituents besides the well known major ones and the bile of one species of animal may show constituents not found in others.

So-called " white bile " seems to have no particular pathological significance and in two of the author's own experiments injection of " white bile " (from dogs with ligature of the common duct) did not produce toxic symptoms. Practically all the variations in colour of bile found in various animals are due to variations in the type of bile pigment which is not non-toxic.

II. The second paper is an experimental study based upon the probability that so fatal a disease as bile peritonitis would show definite changes in blood chemistry (mortality rate in general bile peritonitis of the human subject being quoted from Horral as 50 per cent. or more).

The experimental method consisted in draining the contents of the gall bladder of dogs into the peritoneal cavity, by clipping the fundus, but without ligating the common duct. This procedure did not always cause death and several complete recoveries occurred, but in most cases death ensued in from one to five days with no evidence of intercurrent infection.

In all fatal cases a bile ascites was found and the blood (jugular, during life) showed a constant increase in non-protein nitrogen and urea, attributed to tissue destruction, with a fall in chlorides attributed to vomiting.

H. H. GREEN.

I. Klobouk, A. (1932). Porodní paresa jako hořčíková narkosa. [**Milk Fever as Magnesium Narcosis**].—*Zverol. Rozpravy*. **6.** 13-17.

II. Klobouk, A. (1932). K pathogenesi porodní paresy. [**On the Pathogenesis of Milk Fever**].—*Ibid.* 25-28.

I. The author supports his hypothesis of the pathogenesis of milk fever by analytical data concerning the calcium, inorganic phosphorus and magnesium metabolism in milking cows. The intake of calcium and phosphorus in foods during the period before parturition is usually relatively small, while that of magnesium is high. A very important factor in the pathogenesis of milk fever is the sudden and powerful activity of the mammary gland. A relatively larger amount of calcium and phosphorus than of magnesium is excreted in the colostrum and milk, and the magnesium is retained in the blood. The onset of a profuse lactation, especially in deep milkers, leads to metabolic disturbances. The essential primary cause of milk fever is a magnesium narcosis due to preponderance in the blood of magnesium ions relatively to calcium.

II. This publication refers to extensive data obtained by the systematic determination of calcium, inorganic phosphorus and magnesium in the blood of cows affected by milk fever. [The conclusions formed are incorporated in the first paper of this abstract.]

E. PRIBYL (BRNO).

Gmelin, W. (1931). Die Mondblindheit des Pferdes im Lichte neuerer Forschung. [**Moon-Blindness in Horses in the Light of Recent Investigations**].—*Arch. wiss. prakt. Tierhlk.* **64.** 245-254. 3 figs. [19 refs.]

The author discusses the views which have been expressed regarding the causation of the condition in horses known as moon-blindness, contrasting particularly the " infective " and the " non-infective " theories. As the result of his own examinations of a few eyes from cases of the disease, he forms the opinion that the condition is not due to infection of any kind, but is in the nature of an anaphylactic phenomenon. This supports the view held by Manninger, who considers that albuminous materials absorbed from the alimentary canal are the cause of the condition. It is thought possible that parasitic invasions of the intestine are possibly connected with it.

A. LESLIE SHEATHER.

Bemelmans, E. (1931). Die vollständige Lösung der allgemein bestehenden chaotischen Verwirrung der als " Influenza " bezeichneten Infektionskrankheiten der Pferde. [**Complete Clearing-up of the Existing Confusion**

regarding the Diseases described as Influenza in the Horse].—*Berl. tierärztl. Wschr.* **47.** 761-767.

This paper is scarcely of direct interest to the English veterinary surgeon, as it deals with terminology current in the German language. It is very doubtful whether there is the same or similar confusion in English nomenclature.

A. LESLIE SHEATHER.

I. SEELEMANN, M. (1931). Welches ist die brauchbarste und zuverlässigste Schnellmethode zur Feststellung von Erkrankungen des Euters. [**Which is the most Useful and Reliable Rapid Method for the Diagnosis of Udder Disease ?**].—*Molk. Ztg.* **45.** 525-526. [1 ref.]

II. ROSELL, J. M. (1932). Trois années d'études sur la mammite streptococcique des vaches laitières dans la province de Quebec. [**Three Years Study of Streptococcic Mastitis of Dairy Cows in the Province of Quebec**].—*Rev. Path. comp.* **32.** 133-145.

I. The method which depends on the electrical conductivity of the secretion is not of greater value than the older methods. Moreover, the cost of the apparatus (RM. 220) is more than would be charged for a quarterly laboratory examination of a hundred cows with its attendant advantages of professional advice.

The catalase test is the most useful method and can conveniently be combined (in one operation) with the thybromol test for reaction. For samples which are not fresh, the test for increase of chlorides is to be recommended.

II. The matter is essentially the same as that of a previous article in the *Cornell Veterinarian* [see this *Bulletin*. **2.** 258]. Physical and biochemical characters are more fully considered.

A. W. STABLEFORTH.

I. SEELEMANN, M. (1931). Welches Gemelk ist für die Feststellung von Eutererkrankungen für die Milchuntersuchung am besten geeignet ? [**Which Portion of the Milk is most Suitable for the Recognition of Udder Disease ?**].—*Molk. Ztg.* **45.** No. 128. 3 tables. [8 refs.]

II. WHITEHEAD, H. R. (1930). **A Note on the Direct Microscopic Count of Bacteria in Milk.**—*J. Dairy Res.* **2.** 81-83. 1 table.

I. Fore-milk, middle-milk and strippings from 585 healthy quarters and from 479 quarters infected with streptococci were compared. Fore-milk showed streptococci much more frequently and nearly always in greater numbers ; chloride content was also higher and reaction more alkaline. Conversely, strippings had generally a higher catalase and cell content. It is concluded that fore-milk is to be preferred.

II. When coliform organisms, grown for 24 hours on solid media, were added to milk in the cheese vat immediately before the addition of rennet, a curious anomaly in the direct microscopic count (BREED) was observed. Although cultivation in McConkey's broth showed lactose fermenting organisms to be present to the extent of from 1,000,000 to 1,000 per ml., it was rarely possible by microscopic examination to detect any definite organisms except those originally present. When 4-hour cultures on solid media or 24-hour cultures in broth were used, many of the organisms exhibited strong staining properties. With staphylococci, streptococci and gram-positive bacilli a similar discrepancy was not observed.

A. W. STABLEFORTH.

Seelemann, M. (1931). Einfluss des Maschinenmelkens auf den Gesundheitszustand des Euters. Ergebnisse der Melkmaschinenprüfungen 4 und 5 auf Gut Britz (1929-1930). [**Influence of Machine-Milking on the Health of the Udder. Results of Tests 4 and 5 on the Britz Estate (1929-1930)**].—*Schrift. Reichskurat. Tech. Landwtsch.* No. 24. pp. 23. 33 tables, 8 charts.

The investigations reported were extensive and carefully planned and in each year extended over a period of 14 weeks. In the 1929 series, 114 cows were used. During the first four weeks, all were hand-milked and during this period observations were made on the condition of the udder and milk yield. The animals were then divided into six groups, which were comparable as regards breed, number of lactations, stage of lactation, yield and udder health. Each group contained four animals affected with chronic streptococcic mastitis, three which had shown slight evidence of disturbance during the initial period of hand-milking and twelve which were normal. Normal animals were milked first and affected animals last. In one group hand-milking was continued ; in the other five, machine-milking was substituted, machines of three different makes of the intermittent vacuum type being used. All were stripped by hand.

During the whole course of the investigation laboratory examinations were made every four days and clinical examination daily. The laboratory findings were assessed on a numerical basis, a value of 15 being given to the finding of streptococci, 2 to 16 for abnormal sediment, 1 to 7 for increase of cell content and 1 to 2 for abnormal chloride content.

There was an increase in the amount of udder disturbance in a number of cows in most groups, but no evidence of any difference attributable to the influence of machine milking in the case of either healthy cows or those with some degree of mastitis. The average figures for the hand-milked group were higher than all except one of the machine-milked groups. Transfer of secretion from one cow to another by means of suddenly removing the teat cups, a practice followed in three groups, appeared to have no effect on the results. The fact that in one group a milker was in charge of four machines, with the result that they were left on the udder at least twice as long as necessary, did not appear to be detrimental.

In 1930 a further experiment was made on 100 animals with four machines. The results were more favourable to hand-milking, but were quantitatively rather than qualitatively different.

A. W. STABLEFORTH.

Miaoulis, V. (1931). Coexistence du charbon bactéridien et de la babésiellose ovine. [**Coexistence of Anthrax and Babesiellosis in Sheep**].—*Rec. Méd. vét.* **107.** 463-464.

The author describes losses of sheep in Greece. At *post-mortem* examination the carcasses had appearances of anthrax (verified bacteriologically), but the clinical history was not typical of that infection. Blood examination revealed the presence of piroplasms [unnamed].

J. E.

IMMUNITY.

Orr, J. B., Macleod, J. J. R., & Mackie, T. J. (1931). **Studies on Nutrition in Relation to Immunity.**—*Lancet.* **220.** 1177-1182. 5 tables, 1 chart.

This communication correlates variations in general health, in particular constituents of the blood and in certain serological properties of the serum, with dietetic and seasonal influences ; although of a preliminary nature, it clearly points to the need for extended studies in this important field of biological investigation.

A comparison has been made of two African tribes. The diet of one consisted chiefly of cereals with a low calcium intake and, it is believed probable, a deficiency of one or more vitamins. The average calcium content of the blood serum in 90 natives was 9·4 mg. per 100 c.c. as compared with 11·4 mg. in 13 Europeans living in the same district. Some increase was observed as a result of the addition of calcium salts to the food. The diet of the other tribe, consisting chiefly of milk, meat and blood, was rich in those nutrients which were deficient in the former tribe ; in this tribe it was impossible to obtain blood samples. The difference in the incidence of diseases was, however, notably different. In the cereal-eating tribe pulmonary conditions accounted for 31 per cent. of all cases of sickness, tropical ulcers for 33 per cent. and phthisis for 6 per cent., compared with 4, 3, and 1 per cent. in the tribe with the meat, milk and fresh blood diet. In this tribe the chief disease was rheumatoid arthritis associated with chronic constipation. The cereal-eating tribe suffered from a heavy infestation with intestinal parasites, which was, however, only half as severe in the women, whose diet was appreciably less deficient than that of the men.

In another part of this investigation a comparison was made between sheep (born in the previous spring) grazed on a hill farm, which had been taken over for experimental purposes, where the nutritive value of the pasture was low, and a batch of the sheep removed from the farm to better pasture at Aberdeen. There was a progressive decrease in the body weight of the hill-fed sheep from 49 lbs. in October to 35 lbs. in March, in comparison with weights of 48 lbs. and 50 lbs. for the sheep wintered on relatively good grazing. Only pasture was fed. Chemical examination of the blood showed that in the hill sheep on the mineral deficient pasture the blood calcium reached a maximum in July (11·8 mg.) and fell progressively until April (8·2 mg.). The calcium content of the pasture showed a similar seasonal variation from 0·3 mg. calcium per cent. of dry matter in summer to 0·16 in the winter months.

The serological reactions chosen for observation were natural haemolysins and lytic and agglutinating antibodies for certain bacteria. In May, when the state of nutrition was at its worst and calcium was at its lowest, all the serum reactions were markedly weaker in sheep grazed on the hill farm than in those of the same breed, age and sex grazed on the cultivated pasture at Aberdeen. Haemocytological observation showed great differences amongst individuals under similar dietary and environmental conditions, but there was some suggestion that anaemia was one of the features of malnutrition in spring.

In a third series of experiments, 80 castrated male sheep about seven months old were divided into 16 groups, half of which were kept indoors and half in outdoor pens, in order to ascertain the influence of the addition of calcium, cod-liver oil and protein singly and in combination, when added to a basal diet roughly corresponding to hill pasture in chemical composition. The animals of the indoor basal-diet group stopped growing and became weak and emaciated ; and the addition of protein only delayed this. The addition of calcium and particularly of cod-liver oil prevented these results. No such clinical differences were obvious in the outdoor sheep until a much later date and they never became pronounced. Transfer of the debilitated sheep to good grazing was followed by a rapid improvement. In the animals of the basal group and basal + protein groups the calcium in mg. per 100 c.c. of blood was 10·4 in January and 6·7 in May ; during the

same period phosphorus rose from 5·5 to 10·9. In the animals of the groups which received calcium or cod-liver oil the corresponding figures were for calcium 10·9 and 9·5 and for phosphorus 5·3 and 6·9. These figures refer to the outdoor groups in which no clinical difference had yet become appreciable. In the indoor groups the general trend of the figures for calcium was similar, but the reciprocal rise in phosphorus was not observed.

As regards serological reactions, the average bacteriolytic effect towards *B. coli* rose to a maximum in March and fell progressively in May and September. A similar curve was noted in the haemolytic reaction and agglutination of *Br. abortus*, but the seasonal variations of agglutination of *B. paratyphosus* were different. The effect of diet varied according to the reaction sought, the month and the environment; for details the original should be consulted. It may be noted, however, that towards the end of the experiments certain sheep were transferred to grass and their reactions compared with those in animals kept in pens and rationed as previously. Amongst those on grass a great increase of bacteriolytic activity towards *B. coli* was noted, amounting to 29 times that of animals on rations in pens. A similar difference, though of less degree, was noted with *B. suipestifer* and also in haemolytic power. The influence on the agglutination reaction was the reverse. The results in the lytic reactions could be correlated with the general condition and higher blood calcium content; the agglutination values showed an inverse relationship. The question whether the greater lytic reaction is due to variation in complement or of natural antibodies is regarded as an open one.

A. W. STABLEFORTH.

Mackenzie, R. D., & Marshall, R. S. (1932). **Some Observations on Anti-complementary Sera.**—*J. Path. Bact.* **35**. 175-182. 6 tables. [8 refs.]

Anticomplementary action, which was sufficiently strong to interfere with the reading of complement fixation tests and which in many instances reached a titre of from 1 : 60 to 1 : 240, was noted in nearly 70 per cent. of 135 unselected sera from natives of Northern Nigeria. The sera had been inactivated by heating at 56° C. for 30 minutes. The action was noted in nearly all sera from cases of sleeping sickness, but also in nearly half of the sera from those suffering from other conditions.

It had no relation to the amount of natural complement in the sera, was not removed by filtration and was thermostable, being unaltered or increased by heating at 60° C. for 30 minutes. It is noted that several sera which showed marked anticomplementary action after the usual heating at 56° C. for 30 minutes had no such action in the fresh state.

A. W. STABLEFORTH.

von Gara, P. (1931). Untersuchungen über die Natur der Antikörper. [**Research on the Nature of Antibodies**].—*Zeitschr. Immun. Forsch.* **71**. 1-75. 79 tables. [128 refs.]

After summarizing previous work, the author gives in detail his own experiments which were designed to assess the specific and non-specific response to three antigens—bovine serum, killed typhoid bacilli and sheep erythrocytes—when injected into animals which had received no previous treatment or which had been previously injected with one or more of these antigens.

The response was measured by means of complement fixation, agglutination, haemolysis and precipitation using variable serum or variable antigen, both specific and non-specific antigens being used in most tests. The bactericidal action was also tested on anthrax and typhoid bacilli.

The animals were divided into six groups. The first received ox serum only and was divided into four lots, each containing three experimental animals and one control. The experimental animals of lot A received one injection of 1 c.c. intravenously, those of lot B received two, with an interval of three days and so on, lot D receiving four injections.

The experimental animals of the second group received one to four injections of killed typhoid bacilli; some animals had received no previous treatment, others one or more doses of bovine serum. The third group contained new animals and those which had previously had one or more doses of either or both bovine serum and typhoid bacilli; all were given sheep erythrocytes. The animals of groups 4, 5 and 6 received serum, typhoid bacilli and erythrocytes respectively and contained both new animals and those which had already undergone treatment with one or more of these antigens.

The author concludes that, although the serum of the injected animals showed properties not shown by the controls, the absence of a method of isolating " antibodies " in the pure state makes it impossible to decide with certainty whether this altered behaviour of the serum is to be traced to the genesis of " antibodies." [Author's quotation marks]. The number of injections required to produce a notable alteration in the properties of the sera was at least two, and when allowance was made for individual factors and the limitations of the various methods, the titres obtained in the various reactions ran closely parallel.

In animals which received various antigens, an anamnestic reaction frequently followed the first injection of a new one, but it did not occur after several injections. Frequently, also, animals which had received previous treatment with the same or a different antigen, showed a much more marked response to the first injection of a new antigen than those which had received no previous treatment. Absorption experiments showed that not only with the homologous antigen did nearly complete absorption occur, but that absorption with one of the earlier used antigens often caused a far-reaching fixation of antibodies. It is regarded as possible that the antibody building property of the body or antibodies already formed may, in the presence of a new antigen, undergo an " inversion." (" Umstellung.")

In contrast to the relatively parallel rise of titre as measured by the other reactions, the bactericidal power seemed to show a more or less marked drop.

The author concludes that bactericidal power is distinct but that the other reactions are expressions of one condition and should be regarded as of secondary importance as regards immunity.

A. W. STABLEFORTH.

HEKTOEN, L., & DELVES, E. (1932). **Progressive, Selective Absorption of Precipitins in Multivalent Serum.**—*J. Infect. Dis.* **50.** 237-241. 5 tables. [2 refs.]

In previous experiments it was found that absorption of a multivalent serum with individual antigens gave specific results in most cases [see this *Bulletin*. **2.** 101]. In the present experiments it has been found that the precipitins may be successively removed with reasonable success.

Multivalent sera were prepared in two rabbits with 14 antigens. Portions

of serum were treated successively with several antigens, the precipitate being removed after each treatment and the serum tested against all the antigens involved in the experiment. In one experiment human, beef and chicken blood albumin each removed its own precipitin only, but dog haemoglobin took out turkey haemoglobin precipitin as well as its own. In another experiment human, horse, cat, sheep, hog and turkey haemoglobin each took out its own precipitin ; after the successive absorptions the serum had also lost its precipitin for dog haemoglobin, but it retained its precipitins for all the other antigens in the immunizing mixture.

The serum from the second rabbit which originally had a high precipitin titre for all the antigens injected, no longer reacted with any of the haemoglobins after standing in the ice-box for six months, but showed no obvious loss of other precipitins, which were successively removed.

In another experiment, a rabbit which had been successfully immunized with beef and chicken haemoglobin previously, but whose serum no longer reacted with these, showed a notably prompt and liberal response to the injection of relatively small amounts of seven different haemoglobins ; 0·64 mg. of each haemoglobin led to precipitin titres of 100,000 to 1,000,000. No response to one haemoglobin (dog) was detected. The marked response is ascribed to the residual effects of the earlier immunizations.

A. W. STABLEFORTH.

Hektoen, L., & Cole, A. G. (1932). **Precipitinogenic Action of Minute Quantities of Ovalbumin.**—*J. Infect. Dis.* **50.** 171-176. 1 table. [13 refs.]

Ovalbumin was chosen for the study because its chemical as well as its antigenic individuality is unquestioned and it therefore seemed especially suited to a study bearing on the fundamental nature of immune reactions. The sample used was crystalized six times and was free from all the other proteins of egg white.

Two antisera which gave specific precipitates by the layer method with ovalbumin in a 1 : 100,000 dilution were obtained in rabbits by injections of 0·000,047 g. and 0·000,27 g. of protein nitrogen respectively, corresponding to approximately 0·000,29 g. and 0·001,7 g. of ovalbumin. In one case no precipitate was obtained with lower dilutions of ovalbumin than 1 : 100,000 and in the other case only with dilutions above 1 : 10,000. It is belived that this is due to the small amount of precipitin present. The question whether there is a quantitative relationship between the amount of antigen injected and the amount of precipitin formed must remain unanswered until methods are developed for the quantitative determination of this antibody.

The significance of the finding that such minute amounts of protein can act as an antigen is discussed in relation to the so-called " non-specific " reactions.

A. W. STABLEFORTH.

Kelley, W. H. (1932). **The Antipneumoccocus Properties of Normal Swine Serum.**—*J. Exp. Med.* **55.** 877-888. 6 tables. [3 refs.]

The author has confirmed the findings of earlier workers that the serum of normal pigs possesses the property of protecting mice from infection with virulent pneumococci and of agglutinating virulent S pneumococci, and that absorption with pneumococci of one type prevents its action in regard to that type only. The protective action is, however, relatively slight compared with that

of artificial immune sera and, though resistant to 56° C. for 10 minutes, is no longer present after heating to 65° C. for 30 minutes or preservation for a few weeks even in the cold. Avirulent R pneumococci were also agglutinated and this property was not labile at 65° C. When serum was mixed with purified specific polysaccharide, neither precipitation nor fixation of complement occurred and the protective action of the serum against any particular type was not inhibited by the addition of the homologous polysaccharide to the serum. The protective action was also markedly reduced by absorption with non-specific R pneumococci, but not by other bacteria or non-bacterial adsorbents.

A. W. STABLEFORTH.

CURPHEY, T. J., & BARUCH, H. B. (1932). **The Therapeutic Value of Intramuscular Dosage of Type I Pneumococcus Antisera.**—*J. Exp. Med.* **55.** 925-937. 1 fig., 8 tables. [4 refs.]

Groups of 7 to 11 rabbits were given intradermally 0·1 c.c. of a 1 : 100 dilution of an 18-hour blood culture of Type I pneumococci. One was left as a control ; the remainder were divided into two equal batches in order to compare the effect of different doses of serum at given intervals by the intravenous and the intramuscular routes respectively. From data from 181 animals, selected because they either survived for ten days after the infecting dose or died within ten days from a culturally confirmed pneumococcus infection, it is concluded that intramuscular dosage is as effective as intravenous, provided that the degree of blood stream invasion is not unusually high. From blood cultures made at intervals it appears that, in cases of mild or moderately severe bacteraemia, the immediate bactericidal effect is similar by either route.

A. W. STABLEFORTH.

BURNET, F. M. (1931). **The Flocculation Reaction with Staphylococcal Toxin.**—*J. Path. Bact.* **34.** 759-769. 6 tables. [10 refs.]

This further study, which should be read in the original by those interested, shows that the flocculation reaction previously reported (1931) actually represents a precipitation of the product of toxin-antitoxin union and although certain differences from the diphtheria toxin-antitoxin reaction were observed, it is believed that the two reactions are analogous.

The point of optimal flocculation was always related to the neutral point as judged from haemolysis titrations, but was always in the zone of antitoxin excess and corresponded usually to a mixture of about 0·6 equivalents of toxin to 1 of antitoxin. The supernatant fluid from such mixtures always contained free antitoxin. The washed toxin-antitoxin floccules were soluble in acetate solution at pH 3·3 and from the solution either toxin or antitoxin was recovered by suitable methods. Anatoxin which was just detoxicated showed flocculation reactions unaltered from those of the original toxin. Its binding power under the conditions of the flocculation test was equal to that of the toxin of origin, in contrast to its behaviour in dilute solution where it was half that of the toxin. The toxin was found to be highly resistant to heat. The effect of heating to 100° C. on haemolytic titre, binding power and flocculating power are discussed.

A. W. STABLEFORTH.

Alivisatos, G. P., & Tsolaki, C. V. (1931). Diagnostik der Empfänglichkeit gegenüber Typhus abdominalis mittels intradermaler Reaktion. [**The Diagnosis of Susceptibility to Typhus Abdominalis (Typhoid Fever) by an Intradermal Test**].—*Zlb. Bakt. I. (Orig.).* **123.** 187-195. 3 tables. [7 refs.]

The author's summary is as follows :—Information regarding the susceptibility of human beings can be obtained by using carefully titrated filtrates of autolysates of typhoid bacilli.

The nature of the albumin-free filtrate must be studied more closely, but it would appear that the product is not neutralized at all, or scarcely at all, by immune serum. The use of the product makes it possible to control the result of each inoculation against typhoid, the effect of the vaccine and the duration of the immunity so produced ; and also to indicate better ways of producing immunity.

A. LESLIE SHEATHER.

Zozaya, J. (1932). **The Standardization of Antidysenteric Serum (Shiga).**—*Brit. J. Exp. Path.* **13.** 28-32. 4 tables. [4 refs.]

It is concluded that the method of standardization which depends on the determination of the smallest amount of serum that produces a given amount of precipitate with a standard amount of specific polysaccharide gives more constant results than any other method so far used.

The polysaccharide was obtained by methods similar to those used by Heidelberger and Avery for the pneumococcus. A 1 : 1,000 dilution was used and 0·2 c.c. of this was mixed with an equal volume of serum at different dilutions. The mixtures were incubated at 37° C. for two hours and left in the ice-box overnight, after which they were read. In the case of 14 sera varying in value from less than 50 to 1,200 international units the results obtained by this method were compared with those given by the mouse protection test. The British standard serum was used as a basis for the mouse tests but, owing to the fact that the glycerine used in its dilution interferes with the precipitin test, was for this test replaced by another serum of equivalent value.

A. W. STABLEFORTH.

I. Boquet, A. (1932). Essais de désensibilisation des Cobayes allergiques par la tuberculine, les paratuberculines et les peptones. [**Attempts to desensitize Allergic Guinea Pigs by means of Tuberculin, Paratuberculins and Peptones**].—*C. R. Soc. Biol. Paris.* **110.** 165-168. [6 refs.]

II. Willis, H. S. (1932). **Glycerine as a Vehicle for Tuberculin Dilutions.**—*Amer. Rev. Tuberc.* **25.** 67-73. 5 figs., 1 table.

I. It was found that, contrary to what has been observed in human beings and bovines, the general reaction provoked by the subcutaneous injection of one large dose (0·1 to 0·2 c.c.) of tuberculin does not diminish, or diminishes but little, the dermal sensitivity of allergic guinea pigs. To obtain definite and continued desensitization it is necessary to repeat the injections several times ; (in these experiments two to four times at intervals of 24 hours). Intradermal reactions elicited one or two days after such treatment do not present the usual haemorrhagic and necrotic appearance, but are reduced to a slight thickening which disappears in from 24 to 48 hours. Sometimes no reaction is obtained.

The desensitization is specific in the sense that it is much more easily produced

by proteins of bacillary origin than by the associated peptones. It persists for about two weeks, after which the skin gradually regains its sensitivity.

Repeated injections of tuberculin also decrease the intensity of Koch's phenomenon.

II. Fifty per cent. glycerine in saline or distilled water is not a suitable diluent for tuberculin for use in intradermal tests because it causes induration at the site of injection.

A. W. STABLEFORTH.

LAGRANGE, E. (1932). La mort subite par injection intraveineuse de tissu cérébral. [**Sudden Death as the Result of the Intravenous Injection of Brain Tissue**].—*C. R. Soc. Biol. Paris.* **109.** 536-539. [8 refs.]

Several investigators have reported that the intravenous inoculation of suspensions of brain tissue kills animals of the same species in from one to three minutes. It is invariably fatal in rabbits and fowls and causes a mortality of about 50 per cent. in guinea pigs. [It is of interest to note in this connection that the intravenous inoculation of a suspension of sheep brain into sheep is not followed by any symptoms].

Lagrange has studied this phenomenon on sewer rats. He states that the "toxic" effects are produced only when the brain suspension has been held for 24 to 36 hours in cold storage, 3 hours at 37° C. or 20 minutes at 50° C. He has never observed the phenomenon following the injection of a fresh suspension of brain. [This does not hold good in the case of fowls, as death rapidly follows the intravenous inoculation of fresh suspensions of brain obtained from birds immediately after death].

In an animal anaesthetized with ether, the injection has no immediate effect, but, as the effects of the anaesthetic pass off, the injection causes the death of the animal. Morphia appears to sensitize an animal to the injection while atropine and magnesium salts afford some protection against it.

Rats can be immunized against the brain tissue by repeated small doses or by a preliminary intraperitoneal or subcutaneous injection of brain tissue some hours before the intravenous injection.

The addition of formol (1/50) inhibits the toxicity of fresh brain after one or two days in cold storage.

T. M. DOYLE.

I. DAVIS, G. E., & PHILIP, C. B. (1931). **The Identification of the Blood-Meal in West African Mosquitoes by Means of the Precipitin Test. A Preliminary Report.**—*Amer. J. Hyg.* **14.** 130-141. 5 tables. [17 refs.]

II. ROW, R. (1931). **Precipitin Reaction in Malarial Sera.**—*Trans. Roy. Soc. Trop. Med. Hyg. London.* **24.** 623-627. 1 table, 1 plate. [8 refs.]

III. NICOLETTI, F. (1931). Ueber präzipitierende Sera aus gekochtem Antigen. [**Precipitating Sera against Boiled Antigen**].—*Deuts. z. gerichtl. Med.* **17.** 59-66. [4 refs.]

I. In order to obtain information concerning potential mosquito vectors of yellow fever virus in West Africa, the blood-meal of various species was tested against anti-human and anti-chicken precipitating serum. Tests were carried out on 864 samples from 28 species of Nigerian mosquitoes representing seven genera. A number of tests were also made for sheep, dog, turkey, cat, duck, ox

and goat blood. The antiserum was prepared in the usual manner by the intravenous injection of rabbits. Engorged mosquitoes were captured, killed and laid out on filter paper and the blood sample pressed out on to the filter paper. Extraction with physiological saline was allowed to continue for an hour and the extract was then layered on to undiluted serum. Readings were taken immediately, ten minutes later and two hours later, at 37° C.

Two important house-frequenting mosquitoes, *Taeniorhynchus africanus* and *Anopheles gambiae*, gave positive results for human blood only (195 out of 210 and 154 out of 188 respectively). *Culex nebulosus*, a common domestic-breeding species, was positive for chicken blood only (38 out of 50). No cross reactions were observed, indicating the absence of interrupted feeding on more than one species of host.

II. The author prepares an antigen by washing a malarial culture in saline ; distilled water is added to the deposit to lyse the red cells and the centrifuged deposit is then separated, dried at 37° C. and made up in saline. This preparation is layered over the top of the samples of serum. After three to four hours' incubation at 37° C. a faint ring of opalescence is apparent at the junction of the two fluids. The test appears to be specific and of great help in diagnosis when the parasites have disappeared from the peripheral circulation.

III. Precipitating sera prepared against human blood gave ring reactions with filtrates of human blood which had been heated at varying temperatures for from 10 to 15 minutes. No reaction was registered with blood of the dog, horse and sheep. Blood samples treated with 10 per cent. sodium hydrate, 10 per cent. potassium hydrate or ammonia appeared as denatured antigens and lost their animal specificity.

R. LOVELL.

PUBLIC HEALTH.

LECLAINCHE, E. (1932). Le lait et la tuberculose humaine. [**Milk and Human Tuberculosis**].—*Rev. gén. Méd. vét.* **45.** 79-82.

Professor Leclainche discusses the intertransmissibility of tubercle bacilli and points out that most bacteriologists agree with KOCH in admitting the specific nature of the virulence of the different types, while workers in public health, along with NOCARD and ARLOING, support the possibility of a human infection from cattle and favour the enforcement of strong measures to avoid this grave danger.

It is pointed out that the danger from meat is small compared to that from milk and yet in France it is meat that is controlled, while milk is not subject to any such measures. The author adds that this anomaly applies in most other countries.

While hardly any new facts as to the infection of human beings from meat are brought forward, it is remarkable that the theory of milk infection is strongly supported by many medical and veterinary workers in public health, especially in Great Britain. As the English reports on milk infection are so suggestive it is strange that research has not been carried out in other countries. The author thinks that the explanation is that the type of the bacillus is characterized by a combination of certain characters, culturally and biologically, but that the same tests are not adopted by all. It may be asked if the English bacteriologists show as much keenness as is desirable in the identification of more or less modified human types. In any case, the English regulations are based on this idea and are being carried out more actively since there is a great movement on foot to increase the consumption of milk in schools, etc.

The author then quotes from reports of workers in England, Germany and Denmark and concludes by expressing astonishment that the facts brought to light have not up to now produced either emotion or sufficient research in his country.

D. S. RABAGLIATI.

MINETT, F. C. (1932). **Bovine Streptococcus Mastitis and the Public Health.**—*Vet. Rec.* **12.** 545-553. [21 refs.] [An address given to the Yorkshire branches of the Nat. Vet. Med. Ass. and of the Soc. Med. Officers of Health, Great Britain.]

Readers may be referred to this article as a concise analysis of the facts that have been ascertained regarding the incidence, bacteriology, origin and characteristic features of milk-borne streptococcus infections in human beings and their association with bovine mastitis.

The outstanding facts bearing on the latter question are summarized as follows: " (1) The streptococci ordinarily encountered in mastitis are non-pathogenic for human beings, and can be distinguished bacteriologically from streptococci associated with disease in man. (2) Haemolytic streptococci, which have been cultivated from the milk of certain cows in herds associated with epidemics, have been shown to be indistinguishable from the streptococci isolated from human patients in these epidemics. (3) As a rule, not more than one or two cows in the incriminated herd are found to be infected with these streptococci. (4) Cows which excrete these streptococci either suffer from a clinically recognizable mastitis or they may exhibit an enduring latent infection, in which clinical signs are not obvious. (5) Following an initial and perhaps severe attack of mastitis in one quarter of the udder, the infection may spread to other quarters, in which the disease may appear to be comparatively mild. (6) The excretion of streptococci in the milk may persist for weeks or even months, and the count at times may be very high, even reaching several hundred millions per c.c. (7) For the reasons stated under (4) and (5), milk contaminated with these streptococci might easily find its way into the mixed milk of the herd and for the reason stated under (6) the milk of even a single cow would render the mixed milk, or a portion thereof, dangerous to human beings. (8) Some strains of haemolytic streptococci from man are capable of infecting the cow's udder experimentally. This has been achieved by introducing minute amounts of broth-culture into the milk sinus through the teat canal, as well as by applying cultures or discharges containing streptococci to an abraded surface at the meatus of the teat. (9) Haemolytic streptococci from man, added to raw milk kept at 20° C. for 48 hours, increase in numbers only slightly, whereas the common saprophytic bacteria of milk multiply greatly under these conditions. In the case of scarlet fever streptococci, it has been shown (JONES, 1928), that in blood agar at 37° C. the growth and haemolytic effects are definitely inhibited by milk, even when the concentration of milk in the medium is as low as 1.0 per cent."

It is concluded that the heavy and continuous contamination to which the history of the larger outbreaks of streptococcus disease points can only arise from an actual infection of the cow's udder. Recent investigations point to the fact that infection of the udder with haemolytic streptococci resembling *S. pyogenes* of human beings is more widely distributed than has been hitherto believed.

A. W. STABLEFORTH.

COSTE, E. (1931). Le point de congélation du suc musculaire des viandes de boucherie. [**The Freezing Point of Muscle Juice obtained from Butcher's Meats**].—*Thesis for Docteur vétérinaire, Lyon.*

If certain precautions are taken in obtaining muscle juice from various meats. the determination of its freezing point can be readily undertaken for certain purposes and, as with milk, will yield results of importance. Normally the freezing

point of muscle juice from various meats, particularly those of the horse and ox, lies between -0·80° C. and -1·10° C. The freezing point of blood serum is -0·55° C. and the meat juices are therefore hypertonic with respect to blood serum and are equivalent to salt solutions containing 13 to 18 g. sodium chloride per litre. This hypertonicity is mainly due to salts such as dibasic potassium phosphate, to nitrogenous bases and to lactic acid. As meat ripens it is found that the hypertonicity increases from the point of killing until the meat is well matured, a fact which suggests that the process of ripening is chemical and not physical. With certain types of abnormal meat, e.g. that from cachetic animals, the hypertonicity is greater than with normal animals. With badly bled meat the freezing point of the juice varies with the quantity of blood that was in the vessels. The number of experiments recorded with diseased meat is unfortunately rather small. Industrially the freezing of meat is found to begin at the temperature at which the muscle juice freezes.

W. R. WOOLDRIDGE.

POISONS AND POISONING.

I. Simpson, K. S., & Banerjee, P. C. (1932). **Cases of Poisoning in the Horse with Ratti Seeds (*Abrus precatorius*) by Oral Administration.**—*Ind. J. Vet. Sci. & Anim. Husb.* **11.** 59-65. 2 text figs., 1 plate. [7 refs.]

II. —. (1931). **Poisoning of Horses by Ratti Seeds.**—*J. Roy. Army Vet. Corps.* **3.** 13.

I. Seeds of *Abrus* in the forage were shown to be responsible for the poisoning of army horses in Northern India. The animals displayed normal temperature and slow pulse, general lassitude and apparent paralysis of the hind quarters, inappetence, dilatation of the pupil and twitching of the facial muscles. Later cases were successfully treated by hypodermic injection of arecoline hydrobromide followed by saline purgatives.

The authors record valuable tests by administration *per os* on ponies, dogs, goats and cattle. Ponies refused the dose (a quarter ounce) after the first feeds and the subsequent dosage was therefore made in bolus. The animals showed temporary dullness within the first few days, but on prolonged daily dosage culminating in several successive doses of two ounces, no untoward symptoms were shown.

Single doses of one to two ounces caused death within 24 hours, and *post-mortem* examination revealed appearances of an irritant poison.

Of six dogs tested, one died in 32 hours after a dose of 2·64 drachms, whilst the others recovered after doses ranging from 1·06 to 2·64 drachms. Apart from a slight initial rise of temperature, goats and cattle appeared to be unaffected.

The common *Abrus* seed is scarlet with a black eye and the authors refer to the occurrence in India of black seeds with a white eye and white seeds with black eye. The seed, which is sometimes used for ornamental purposes, is also known as gunj, jequirity, or crab's eye and contains the toxine " abrine " characterized by the production in the organism of a specific antibody.

II. This note apparently refers to the subject matter of the preceding abstract.

G. D. LANDER.

KESTER, B., & JOHNSON, T. W. (1932). **Nitrobenzene Poisoning in the Dog.**—*J. Amer. Vet. Med. Ass.* **80.** 254-258. 1 text fig. [2 refs.]

Nitrobenzene had been used as a deodorizer and repellent of fleas in a box in which two young bitches slept and caused poisoning by inhalation and probably also by absorption through the skin. The dogs showed normal temperature, weak pulse, dilated pupils, profuse salivation, tucked-up abdomen and persistent constipation. There were frequent muscular spasms, the subject falling on the side with the uppermost fore-leg abducted, or on the sternum with fore-legs extended and hind-legs flexed. Similar symptoms were induced in a hound pup by painting the inside of the sleeping box with 7 ounces and later applying 3 c.c. of the material to the dog's back.

G. D. LANDER.

MUNCH, J. C., & SILVER, J. (1931). **The Pharmacology of Thallium and its Use in Rodent Control.**—*U. S. Dept. Agric. Bull.* No. 238. pp. 28. 6 tables. [148 refs.]

This paper contains a useful general account of the pharmacology of thallium (thallous salts) and a valuable set of references to the literature. Thallium salts appear to have been introduced as rodent poison about 1920 by a German firm. In view of the high toxicity and lack of taste, odour, or other warning property, the authors do not recommend the general inexpert use of these salts. The following data expressed in mg. per kg. body weight *per os* illustrate the relative toxicity of common rodent poisons—thallium 25, strychnine 20 to 25, arsenious oxide 100, red-squill powder 250 and barium carbonate 750. Doses of 25 mg. per kg. upwards (reckoned as metallic thallium) kill rats within five days whilst the same minimum dose killed rabbits after intravenous injection within one day.

Acute poisoning of rats is marked by restlessness and laboured breathing, death ensuing from respiratory failure. Chronic poisoning is marked by nervous symptoms, general alopecia and disturbance of the endocrine glands and of calcium metabolism. The poison is eliminated slowly through the usual channels and is therefore cumulative.

G. D. LANDER.

HORNUNG, W. (1932). Chronaxiemessungen am Pferd (im Hinblick auf die Dopingfrage). **[Measurement of Chronaxia in the Horse (with Regard to the Question of Doping)].**—*Arch. wiss. prakt. Tierhlk.* **64.** 366-372. 1 text fig., 1 table. [4 refs.]

Chronaxia is measured by determining the current intensity required to cause a reaction on the facial nerve and muscle. The time (in thousandths of a second) required to cause a reaction by a current of twice this strength is then determined. For technique the original paper should be consulted.

Observations on a thoroughbred stallion are tabulated. The figures vary widely among themselves (from 0·329 to 0·658) and subcutaneous injection of heroin, morphine and cocaine did not produce great variations. The measurement is therefore valueless from the point of view of diagnosis of drugging.

Observations on a gelding showing haemoglobinuria and right-sided facial paralysis disclosed an increase in the time figure of about 25 per cent.

G. D. LANDER.

PHYSIOLOGY.

YOUNG, J. S. (1931). **The Effects of Repeated Intrapleural Injections of Electrolytes in the Rabbit—Acquired Insensitiveness of the Lung Epithelium to a Proliferative Stimulus: the Bearing of the Observations on Tissue Resistance.**—*J. Path. Bact.* **34.** 357-377. 8 figs. [6 refs.]

A single intrapleural injection of a 3/4 N solution of strontium chloride will produce hyperplasia of the epithelium lining the marginal alveoli of the lung of a rabbit. No further reaction follows a second injection of the same solution if this takes place within fifteen or twenty days after the first, but a more delayed second injection leads to further response. If repeated injections be made, starting with a comparatively weak solution (N/16) and increasing in strength, all hyperplasia can be avoided and finally a normal solution may be injected without inducing response. This increased resistance is a local phenomenon; it cannot be established by intravenous or intraperitoneal injection of the electrolyte. Nor is it strictly specific since it appears that calcium chloride injection can afford some protection against strontium chloride.

The significance of these observations is discussed with reference to the nature of the biological processes concerned in the onset of proliferation and it is concluded that they are consistent with the hypothesis that cell division is initiated by a precipitation of the colloids of the cell membrane.

W. R. WOOLDRIDGE.

TECHNIQUE.

BACH, O., DELÉTANG, R., & FABRE, R. (1931). Contribution à la réaction de Gram. [**A Contribution to the Study of Gram's Reaction**].—*C. R. Soc. Biol. Paris.* **107.** 666-668. 1 table. [2 refs.]

DELÉTANG, R. (1932). Contribution à l'étude de la réaction de Gram. Action de divers fixateurs sur la résistance à la décoloration. [**A Study of the Influence of Fixation on the Resistance to Decolourization after Gram's Stain**].—*Ibid.* **109.** 162-163. 1 fig. [4 refs.]

The first paper deals with variable staining results obtained with Gram's staining method using *Saccharomyces pastorianus* (yeast cells) as test organisms. After staining smears in the usual way, decolourization was carried out for various periods up to 10 hours. After half an hour quite a number of cells were found to be decolourized by the acetone alcohol mixture used and after 10 hours nearly all the cells were decolourized. It was considered that the age of the cell was probably a factor in determining the rapidity of decolourization.

The second paper gives the results of the influence of various fixatives on the ultimate time of decolourization. Of the fixatives used, alcohol-ether mixture, Bouin's solution, sublimate-acetic acid mixture, Müller-formol mixture and Champy's fluid, the last one mentioned intensified the resistance to decolourization.

J. R. M. INNES.

MISCELLANEOUS.

LEPLAE, E. (1931). Agriculture au Congo belge. [**Agriculture in the Belgian Congo**].—*Ann. Méd. vét.* **76.** 441-443.

The important stock-raising areas of the Belgian Congo consist of two native

areas containing 1,200,000 head of cattle and five areas containing 70,000 head of cattle in which Europeans have developed the stock industry.

The Congo service provides 19 veterinary officers of whom 8 are Belgian and 11 foreign. The author refers to the difficulty of recruiting and says that a big decrease has occurred in the number of veterinary students owing to a revision of the veterinary educational curriculum to bring it into line with medical education. All the men qualifying are easily absorbed in Belgium.

It has been suggested that the Congo Veterinary Service be separated from the Agricultural Service, but the author considers that this would only be justifiable in the big stock-raising areas.

U. F. RICHARDSON.

HOLE, N. (1931). **The Poultry Industry : A New Field for the General Practitioner.**—*Vet. J.* **87.** 74-78. [7 refs.]

This is a statistical article in which the author points out the great economic importance to the country of the poultry industry and the effects of poultry diseases. This seems to be a field of work which up to the present has been rather ignored by the general practitioner.

NORMAN HOLE.

—. (1931). L'Institut National Roumain de zootechnie à Bucarest. [**The Roumanian National Institute of Zootechny at Bucarest**].—*Rev. gén. Méd. vét.* **40.** 569-572. 1 plate.

Under a law passed in 1919, the veterinary public health and zootechnical organizations of Roumania were united and placed under a single directorate subordinate to the Minister of Agriculture. As in Bulgaria, this entire service is confined to veterinarians. It has performed very valuable work in developing livestock in Roumania and in 1925 was made more elaborate by a royal decree under which a National Zootechnical Institute to deal with general zootechny was founded. The institute carries on agricultural instruction and research and is in close touch with the Faculty of Veterinary Medicine of Bucarest University. Associated with the institute are a number of experimental farms.

A brief outline of the departments of the institute is given. Work has been carried out on the acclimatization of foreign breeds of cattle, on breeds of sheep and their wool and on the control of dairies.

J. E.

—. (1931). Första baltiska veterinärkongressen i Riga, 1931. [**The First Baltic Veterinary Congress at Riga, 1931**].—*Skand. Vet.-tidskr.* **22.** 30-31.

This is the first combined meeting to be held by the veterinarians of the three Baltic republics, Esthonia, Latvia and Lithuania, which were separated from Russia in 1920. It was held in September, 1931, at Riga, the capital of Latvia, and the chief veterinary representatives of each state participated under the presidency of Docent BRENCENS of Riga ; 120 people were present. The languages used were Russian and German. The following eight papers were presented at the meeting :—" Report on Bovine Mastitis " (ROLLE, M.) ; " The Administrative and Professional Veterinary Status " (ARRAS, A.) ; " On Frontier Control of the Baltic and other Countries " (ATRENS, K.) ; " Veterinary Settlements in connection with the Control of Animals and their Products " (HERODES) ;

" Swine Fever and Its Control in Lithuania " (JANKAUSKAS) [reprinted in the *Deuts. tierärztl. Wschr.* **40.** 1.] ; " Bovine Contagious Abortion and Milk Production " (LAJA, F.) ; " On the Serum Laboratories in the Baltic States " (KIRSCHENSTEIN, A., & PETERSON, H.) ; " The Professional Conduct of Veterinarians in the Baltic States " (KANAUKA, K.). It is stated that there are now 350 veterinarians in the three Baltic states.

J. E.

VAN SACEGHEM, R. (1931). Aperçu scientifique sur les Elevages au Congo. **[A Scientific Consideration of the Problems of Animal Husbandry in the Congo].**—*Ann. Méd. vét.* **76.** 430-441.

The author discusses the methods that may be adopted to improve the cattle in the Congo. He draws attention to the necessity of providing food reserves for periods of drought, the lack of calcium and phosphorus in the soil and the prevalence of epizootic and enzootic diseases. He particularly emphasizes the importance of piroplasmoses and East Coast fever.

He points out that native cattle have been acclimatized to these conditions by centuries of natural selection and that types of these cattle exist which are suitable for dairy purposes and for slaughter. Selective breeding has been undertaken at a farm near Kivu from which bulls can be distributed to improve native herds. He discusses the grading of native cattle by the importation of European breeds and points out that with proper precautions good results can be obtained, but he draws attention to the heavy losses which have occurred in the past owing to rash premature action. He suggests the formation of a station at which imported cattle could be immunized to the diseases prevalent in the area for which they are intended. He points out that imported cattle are subjected to changes in feeding and conditions and when weakened in this way are exposed to local enzootic diseases such as piroplasmosis, their chances of survival thus being considerably reduced.

U. P. RICHARDSON.

RICHARDSON, A. E. V., TRUMBLE, H. C., & SHAPTER, R. E. (1931). **Factors affecting the Mineral Content of Pastures With Particular Reference to the Environmental Conditions Incidental to Southern Australia.**—*Council Sci. & Indust. Res. Australia. Bull.* No. 49. pp. 47. 9 figs., 18 tables. [20 refs.]

A paper dealing with certain co-operative investigations initiated about 1928 at the Waite Institute, Adelaide, with assistance from the Empire Marketing Board and the Australian Council for Scientific and Industrial Research, yielding data of considerable importance to other Dominions and Crown Colonies in which mineral deficiencies and associated stock diseases are prevalent, [see this *Bulletin.* **2.** 391].

The authors investigated the mineral and nitrogen content of pasture plants with special reference to a region of winter rainfall and summer drought. Pure species grown under similar soil conditions in controlled pot cultures showed wide differences in mineral and nitrogen content, relative yielding capacity, mineral assimilation in relation to transpiration and absorption of phosphorus from insoluble phosphate. Seven different species of plant were shown to possess selective absorptive capacity with respect to specific minerals.

Growth stage was found to exercise a determining influence on mineral content of pasture grasses. The percentage of nitrogen, phosphorus and

potassium and to a lesser extent calcium and magnesium, fell rapidly from the early tillering stage to maturity.

The application of soluble phosphates did not increase the phosphorus content of the plants grown on fertile soil, but on phosphorus deficient soil increased the values to those from a rich soil.

On soils of low moisture content the production of dry matter was low, but the protein, calcium and magnesium were higher at the flowering stage than in the case of wet soils. On the other hand the phosphorus content was lower at the flowering stage under dry conditions although no significant difference was shown at maturity.

The authors conclude that under the environmental conditions of Southern Australia it is possible to increase considerably the output of grazing animals by establishing persistent species of suitable plants, efficiently utilizing the pasture by good management and rectifying deficiencies of essential minerals by suitable fertilizers.

H. H. GREEN.

OFFICIAL AND OTHER REPORTS.

WALL, Sven. (1931). Berättelse över Verksamheten vid Statens Veterinärbakteriologiska Anstalt. Räkenskapsåret 1930-31. **[Report on the Activities of the State Veterinary Bacteriological Institute (Stockholm) for the Financial Year 1930-1931].** 61 pp.

The report deals with the work of the State Veterinary Bacteriological Institute of Sweden and of a sub-station located at Vindelu near Umea.

The State Institute is one of the block of buildings constituting the Veterinary School in Stockholm and is under the direction of Dr. Sven Wall. It is divided into two main departments, diagnostic and serological, for each of which a list of the staff is given. The work of the Diagnostic Section is presented in four tables.

Table I is arranged according to animal species and shows the diseases diagnosed in each species during the year.

Table II summarizes the examinations made of food products and water. Milk examination is considered separately.

Table III is arranged according to parts of the body and shows the organic disease conditions diagnosed during the year.

Table IV tabulates the results of the examinations for tuberculosis of 3,678 samples of cows' milk, from the results of which a map is added depicting the relative frequency of udder tuberculosis throughout Sweden.

Of the diseases of major importance in Sweden, tuberculosis and contagious abortion are common as elsewhere and *B. pyogenes* infection is of considerable economic significance, this organism being found in bovine pneumonia, bovine mastitis (231 cases), and in both pre- and post-parturient metritis. The bacillus of malignant oedema was present in 61 cases of post-parturient metritis examined.

Ankylostome infestation was found frequently (405 cases) in the fox.

The work of the Serological Section is set out in seven tables. The first table of this section number V, presents the statistics of diseases diagnosed serologically, e.g. contagious bovine abortion, equine pernicious anaemia and " bacillary white diarrhoea " (pullorum disease) in poultry. No cases of glanders or equine abortion were diagnosed.

Tables VI and VII tabulate the incidence of *Br. abortus* infection amongst the cattle of Sweden. The highest percentages of infected farms occur in the provinces Väst Manlands and Ostergötland. Tables VIII and IX present a similar analysis with regard to equine pernicious anaemia, whilst tables X and XI refer similarly to " bacillary white diarrhoea " in poultry.

Further paragraphs deal with the issue of tuberculin, mallein and other biological agents issued by the Institute.

Finally a list is given of the publications issued by the staff during the year.

G. B. BROOK.

BOOK REVIEWS.

FELDMAN, W. H. (1932). [D.V.M., M.S., Division of Experimental Surgery and Pathology, The Mayo Foundation, Rochester, Minnesota]. **Neoplasms of Domesticated Animals.** Foreword by Charles H. Mayo, M.D. 410 pp. 2 tables, 193 illustrations. [688 refs.] Philadelphia and London : W. B. Saunders & Co., Ltd. [30s.]

While there is voluminous literature concerning neoplastic diseases in the human being, little information has been available regarding analogous conditions in domesticated animals. From the point of view of comparative pathology the appearance of this monograph is therefore welcome. It should be a very useful book of reference to those workers interested in cancer research, to veterinary pathologists and to veterinary students who in the past during their course in pathology, have been obliged to utilize medical text books to obtain information on this branch. The subject matter is well arranged and is profusely illustrated by many excellent photo micrographs and photographic reproductions of naked-eye specimens, a feature which enhances its value as a student's text book.

The author adheres to the custom of writers of text books on neoplastic diseases in giving introductory chapters on the biology and general characteristics of tumours. While this is perhaps necessary these chapters contain nothing new nor any original observations. More detailed information on this aspect can be obtained by reference to such a standard text book as EWING'S " Neoplastic Diseases." The author has adopted MALLORY'S classification of tumours which, although much in vogue in America, has never found any ardent support elsewhere. If the book is used by veterinary students in this country this procedure may cause some confusion.

The chapter on the incidence of tumours is too fragmentary to be of any real conclusive value and accurate authentic information has still to be obtained regarding the influence of age, sex, breeding, etc., on the occurrence of tumours in domestic animals and on the incidence of the various types. No mention is made of the incidence of cancer in two species of animals, the rat and mouse, where the data are very complete. This is important because CRAMER has shown that in the case of these animals, wherever malignancy occurs, it shows the phenomenon of age-incidence characteristic of the disease in man.

A chapter is allocated to each different type of neoplasm ; these are dealt with from the clinical and pathological viewpoint under the headings of incidence, points of origin and location, metastasis and malignancy, macroscopic appearances and histology. This represents the total results of examination of over 600 specimens. The inability of the author to obtain specimens of the more uncommon types has resulted in the omission of descriptions of tumours such as any of the

eight varieties of gliomata or the neuroblastoma ; teratology has likewise not been included because of the scarcity of material. The description of rather rare types of tumours in animals such as the giant-cell sarcoma and malignant rhabdomyoma is of interest.

The classification after MALLORY of the various diseases of the blood and blood-forming organs under the general headings of lymphoblastoma and myeloblastoma has not been generally accepted and is still a matter of controversy. The existence of Hodgkin's disease in the lower animals is considered never to have been proved. A special chapter is devoted to the transmissible lymphosarcoma or " venereal granuloma " of dogs and another to a brief and rather incomplete account of the other experimentally transmissible tumours of animals.

J. R. M. INNES.

BÜRGI, Emil. (1932). Das Chlorophyll als Pharmakon. [**Chlorophyll as a Medicament**]. 84 pp. 28 graphs. Leipzig : Georg Thieme. [RM. 6·40.]

This monograph covers the results of 20 years' work on chlorophyll, by the late Professor Bürgi of Bern.

Since haemoglobin and chlorophyll are closely related chemically, considerable physiological and pharmacological significance is attached to chlorophyll by the author. He regards chlorophyll as significant in the physiology of nutrition and as a general haemopoietic tonic. He relates chlorophyll and its derivatives to vitamin A [compare abstracts in this journal dealing with the relationship between carotene and vitamin A] and considers that there are a number of different vitamin A factors all having a growth-promoting action.

The latter part of the work is devoted to a discussion of chlorophyll as a therapeutic agent in human medicine and in considering certain favourable reports of its use in tuberculosis, arteriosclerosis, and other diseases ; the author treats the action as entirely unspecific. Any favourable influence is interpreted as a general tonic effect.

The monograph provides an extensive bibliography of researches dealing with the chemistry and physiology of chlorophyll, from which text quotations are numerous.

From the point of view of the veterinarian the work deserves attention in relation to questions such as superiority of green pasture over winter feed, and to discussions concerning the vitamin requirements of domesticated animals.

J. E.